THE OXFORD GEOGRAPHIES

EDITED BY A. J. HERBERTSON

THE ELEMENTARY GEOGRAPHY

VOL. VII: THE BRITISH ISLES

BY F. D. HERBERTSON

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BRITISH ISLES
SCALE
English Miles
0 50 100
Kilometres
0 50 100
Land above 300 feet Light Brown.
Land above 1200 feet Dark Brown.
Orkney Is.
Pentland Firth
C. Wrath
Lewis
Lornoway
St. Kilda
Hebrides
Moray Firth
Aberdeen
Stonehaven
Montrose
Dundee
Firth of Tay
St. Andrews
Firth of Forth
Bass Rock
St. Abbs Hd.
Berwick
Mull
Oban
Perth
Stirling
Leith
Edinburgh
Glasgow
Arran
Ayr
Galashiels
Dumfries
Carlisle
Newcastle
Sunderland
Durham
Hartlepool
Middlesbrough
Scarborough
Whitehaven
Solway Firth
Coleraine
Londonderry
Donegal
Belfast
Belfast L.
Larne
Donegal Bay
Sligo
Aberdeenshire Highlands
Grampians
Central Lowlands
Southern Highlands
Lake District
Yorkshire Moors
OCEAN
NORTH SEA
55
55

G V Darbishire, Oxford, 1904

THE OXFORD GEOGRAPHIES

EDITED BY A. J. HERBERTSON

THE ELEMENTARY GEOGRAPHY

VOLUME VII

THE BRITISH ISLES

BY

F. D. HERBERTSON, B.A. (LOND.)

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WITH 3 COLOURED AND 29 OTHER MAPS
AND 41 ILLUSTRATIONS

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AT THE CLARENDON PRESS
LONDON, EDINBURGH, NEW YORK, TORONTO, AND MELBOURNE
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PREFACE

This volume, the last of the *Elementary Geographies*, continues the study of the geography of the British Isles begun by *In and about our Islands*, Volume II of the series. The method of the present volume is still mainly descriptive, but it has been supplemented by the use of contoured maps and sections, so that pupils who have worked through this and one or more of the earlier volumes will have learned to read maps of many kinds, and will be ready to begin Dr. Herbertson's *Junior Geography* or any other textbook which has a similar standard and conception of geography.

This transitional character of the book will, it is hoped, supply a very real want. One of its most useful features is the use of contoured maps to be coloured by the pupils themselves. Experience has shown that the reading of contour maps is more easily taught by this than by any other method, and the colouring of the maps which have been introduced for the purpose (Figs. 2–6, 7, 11, 15, 16, 23, 34, 45, 46, 53) should on no account be omitted.[1] The important subject of climate is treated very simply in Chapter IV, and in a more advanced manner in Chapters XXXIV—XXXV. Younger pupils may simplify the colouring of the maps, &c. Many geographies begin with detailed descriptions of climate which cannot but fatigue young readers. Chapter IV gives only those aspects of climate which help children to understand the important part it plays in the life of our Earth. In the view of the author more than this should not be attempted at first. Teachers who think otherwise can pass on from Chapter IV to Chapters XXXIV—XXXV. Hardly any of the illustrations are duplicates of those in Vol. II, and those who possess both volumes should compare the two sets.

BELLAGIO, *September* 30, 1909.

[1] It is proposed to issue a Teachers' Edition containing coloured maps with some questions and hints.

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THE COLOURED MAPS

The British Isles	*Front end-paper*
England	*Back end-paper*
Scotland	,, ,,

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NOTE TO TEACHERS

IMPORTANT

The contour lines above 1,000 feet have been added for the sake of completeness, but it would, in most cases, be sufficient to colour all the land above 1,000 feet the same colour.

The land below 200 feet has been stippled to allow the 200 feet contour line to be more readily seen. In colouring the maps the stippled portion should be left as it is.

Figures 7, 15, 16, and 46 are easily coloured and may be taken first. Figs. 11, 23, 34, 45, and 53 are more difficult. A satisfactory plan for these would be to colour all the land above 200 feet with a light shade of brown. This would be one exercise. A second exercise would be to put a darker shade of brown over the land above 600 feet. In a third exercise a still darker brown would be put over the land above 1,000 feet. The lines may be traced first in pencil, if preferred. The other contour lines may be disregarded, if the teacher wishes.

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CHAPTER I

THE COLOURED MAPS

1. The Map. The maps at the ends of this book are coloured blue, white, and two shades of brown. The blue is sea. The rest is land. The white land is less than 300 feet above the sea. The light-brown land is between 300 and 1,200 feet high. The dark-brown land is over 1,200 feet high.

2. Land of the same colour is not all of the same height. Some of the white land is hilly, but no hills in it rise more than 300 feet above the sea. Some of the light-brown land is just over 300 feet high, and some is just under 1,200 feet. The dark-brown land varies still more. Some is very little over 1,200 feet high, while some is more than three times as high. Even the blue seas are not all of the same depth. They are quite shallow near the land.

3. Contour Lines. The line along which blue and white meet shows land at sea level. With a sharp pencil draw a fine line round the edge of the light-brown land. The line where white and light-brown meet shows land exactly 300 feet high. Draw a fine line round the edge of the dark-brown land. The line where light and dark-brown meet shows land exactly 1,200 feet high. These lines are called contour lines. They show the shape or contour of the higher land The contour lines of 0, 300, and 1,200 feet are now shown in the coloured map.

4. Ordnance Survey Maps. The mapping of a country is done by a Government Department, called the Ordnance Survey. The maps which it publishes are called the Ordnance Survey maps.

5. Ordnance Survey maps are made on different scales. The largest are one-fivehundredth part of the

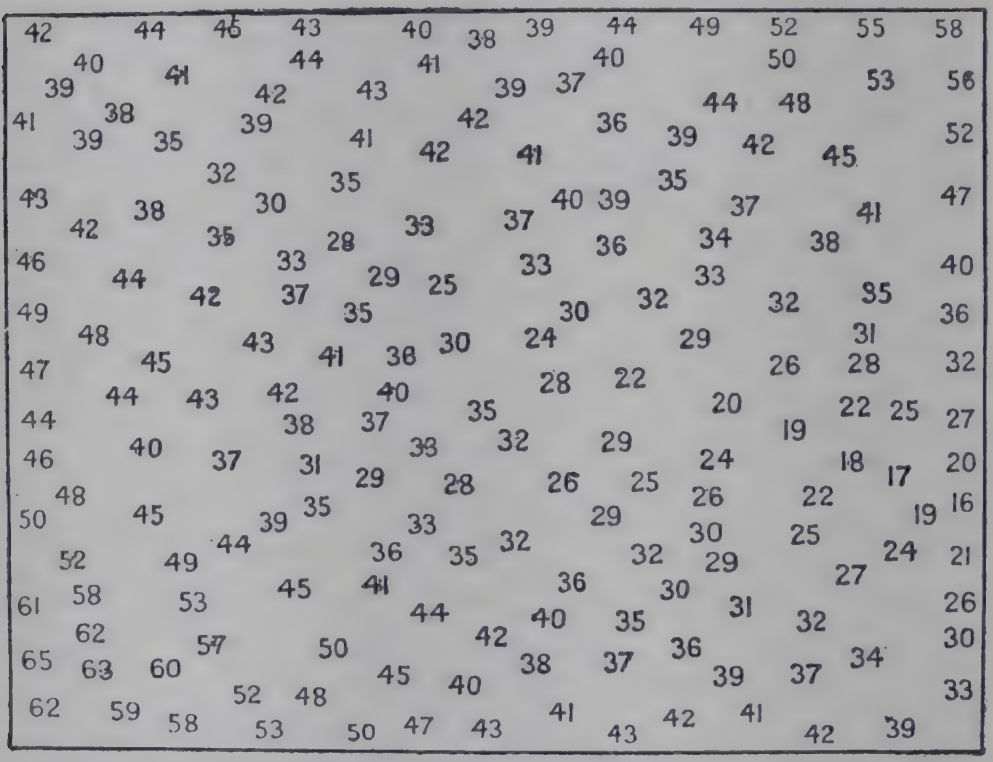

FIG. 1. (See § 6.)

real size of the British Isles. A length of one inch on such a map represents 500 inches or nearly 42 feet of real country. Maps in which a length of one inch on the map represents one mile of real country are large enough for most purposes. The maps in this book are on a much smaller scale than this.

6. Millions of observations are made before an Ordnance Survey map is drawn. The height of the land is measured all over the country at very short

distances apart. The map in Fig. 1 shows such a set of observations written down. These give the height of a piece of land under 100 feet high and not level.

7. Fig. 2 shows both the observations and some contour lines drawn from them. We can draw as many as we like. In Fig. 2 they are drawn for every 10 feet.

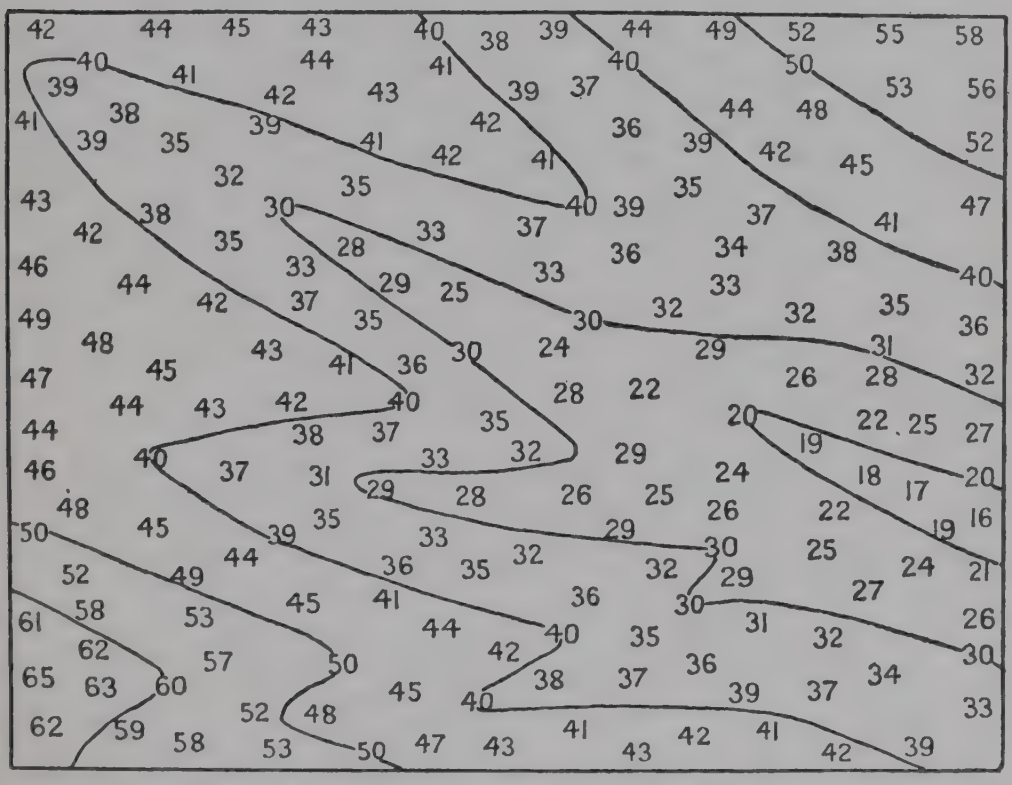

FIG. 2. This shows the same observations as Fig. 1, but the contonrs are drawn for every 10 feet, beginning with the 20 feet contour line.

After the contour lines are drawn the observations need not be printed on the map, but the contour lines must be numbered. In Fig. 3 the contour lines are drawn and numbered for every 10 feet, but the observations (Figs. 1 and 2) are not shown.

8. In a flat country it may be useful to draw the contour lines for every 10 feet, but in hilly country it is enough to draw them for every 50 or 100 feet. In describing a country only the more important contour

lines are used. The 300 feet line is a useful one in our own country. The land below this is low land. In some maps the 500 feet line is taken as the division between high and low land. It is another useful line. The line of 1,000 feet or of 1,200 feet is also important. Land above this height is of little use for settlement in

Fig. 3. This shows the same contour lines as Fig. 2, but without the observations.

this country, and it is high enough to form a barrier between the low lands. If the contour lines of 2,000, 3,000, or 4,000 feet had been drawn on the coloured maps, we should have seen that very little of our country is over 2,000 feet high.

9. The Scale of the Map. You will find a scale of miles on each coloured map. These show what distance an inch line on the map represents. To find the distance between two places, measure the distance

between them on the map on a slip of paper. Put this along the scale of miles on the map and read the distance in miles.

10. The Latitude and Longitude of the British Isles. You have learned that lines of latitude and longitude are used to fix the position of places on the globe. The lines or parallels of latitude show how far places are from the equator. Find the latitude of the British Isles, first on the globe and then on the map. The latitude of the most southern point of the British Isles is 50 degrees north of the equator, written 50° N. If so, it is 40 degrees south of the north pole. A degree of latitude measures rather less than 70 miles. The extreme south of England is less than 3,500 miles from the equator and less than 2,800 miles from the north pole. The extreme north of the mainland of the British Isles is more than $58\frac{1}{2}$ degrees north of the equator. A degree is divided into 60 minutes, written 60′. The extreme north of the mainland of the British Isles is very nearly 58° 40′ N. lat. The most northerly of the islands is more than 60 degrees north of the equator, or nearly 700 miles nearer the north pole than the most southern point of the British Isles.

11. Lines or meridians of longitude measure distance east or west of a given place. Nearly all countries agree to take Greenwich Observatory, near London, as the starting-place. The line drawn on the globe through Greenwich and the north and south poles is used as the zero meridian. It is numbered 0°. Find it on the globe. All other distances are measured east and west of the zero meridian. Find the longitude of the British Isles on the globe and on the map. The most easterly point is nearly $1\frac{3}{4}$ degrees east of Greenwich. The exact longitude is 1° 44′ E. The most

westerly point is almost exactly $10\frac{3}{4}$ degrees west of Greenwich. Its longitude is 10° 46′ W. The globe shows that a degree of longitude varies. It measures most at the equator and decreases towards the poles.

EXERCISES[1]

1. In what ocean are the British Isles?
2. Name the two largest of the British Isles.
3. Measure the length of the largest island from north to south. Into what parts is it divided?
4. What sea separates the two largest islands?
5. Find the Irish Sea on your map. How is it entered from north and south?
6. Where is the highest land in the larger island?
7. Where is the high land in the smaller?
8. Measure the breadth of the Irish Sea at its broadest.
9. Name the strait between the larger island and France. How broad is it?
10. What sea washes the eastern shores of our largest island?
11. What sea washes the southern coast of the largest island?

[The globe may be consulted as well as the map.]

CHAPTER II

SECTIONS

12. Contour Maps. Fig. 1 gave a set of observations. Fig. 2 showed both the observations and the contour lines drawn from them. Fig. 3 showed the contour lines without the observations. Such maps are called contour maps. We can make them clearer by colouring them.

[1] A large number of useful exercises on contour maps will be found in Unstead's *Practical Geography*, Part I (Clarendon Press).

Colour the map in Fig. 3. Leave the ground under 20 feet white. Put a wash of light brown over the rest. Put a second wash of brown over all the land over 30 feet high, and a third wash of brown over the land more than 40 feet high. Put a fourth wash of

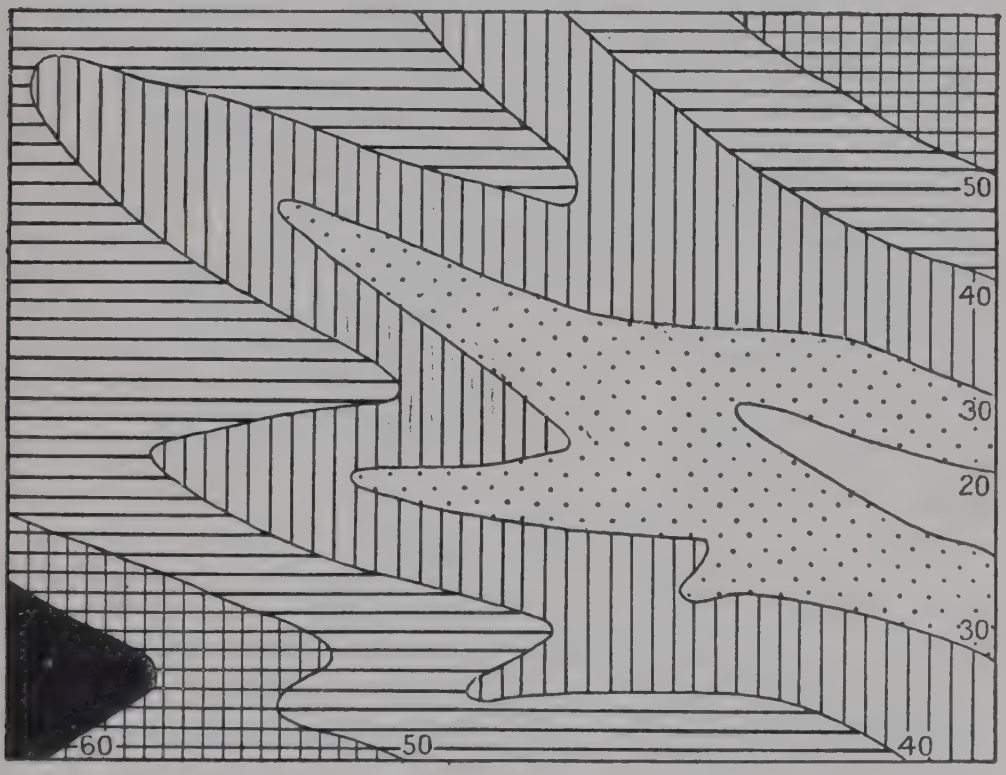

Fig. 4.

brown over the land more than 50 feet high, and a fifth and last wash over land more than 60 feet high. The difference of height is much clearer than before.[1]

13. Contour maps are often shaded instead of coloured. This has been done in Fig. 4. Land under 20 feet is white. Land between 20 and 30 feet high is dotted. Land between 30 and 40 feet high is shaded

[1] If the paper is not made too wet a very good effect can be obtained. Different shades of brown chalk may be used instead.

vertically. Land between 40 and 50 feet high is shaded horizontally. Land between 50 and 60 feet high is shaded crossways. Land over 60 feet high is black.

14. How to make a Section. Now we want to see what the surface or edge of different parts of this land looks like. We can find this out by drawing lines on the map, and finding the section or profile of the land along that line.

15. In Fig. 5 a section is to be made along the line AF. Mark the points B, C, D, and E, and where the line AF cuts the contour lines of 60 feet, 50 feet, 40 feet, and 30 feet. Draw a set of parallel lines below the map $\frac{1}{10}$ inch apart.[1] Number these from the bottom upwards, 0 feet, 10 feet, 20 feet, 30 feet, 40 feet, 50 feet, 60 feet, and 70 feet. Draw a line from B at right angles to the line AF to cut the ruled line numbered 60 feet at B′. Draw a line from C at right angles to AF to cut the ruled line numbered 50 feet at C′. The line from D will cut the 40 feet line at D′, and the line from E will cut the line numbered 30 feet at E′. The line from F′, which is about 25 feet high, is drawn to a point between the 30 and 20 feet lines. The line from A, which is about 65 feet high, is drawn to a point A′ between the 60 and 70 feet lines. Join the points A′, B′, C′, D′, E′, F′. The line A′F′ is the section along the line AF and it represents land which rises gradually from F to A. This rise is much more gradual between E and D, where the contour lines are far apart, than it is between C and B, where the contour lines are closer. Wherever contour lines are far apart, the slope is gentle. Wherever they are close, the slope is steeper.

16. Now take a more difficult section across the map from G to O (Fig. 6). Mark the points H where this line

[1] Ordinary ruled squared paper does quite well.

cuts the 40 feet contour line, I where it cuts the 30 feet line, J, K, and L where it again cuts the 40 feet line, and M and N where it twice cuts the 50 feet contour line. Draw lines from H, J, K, and L to H′, J′, K′, and L′ on the

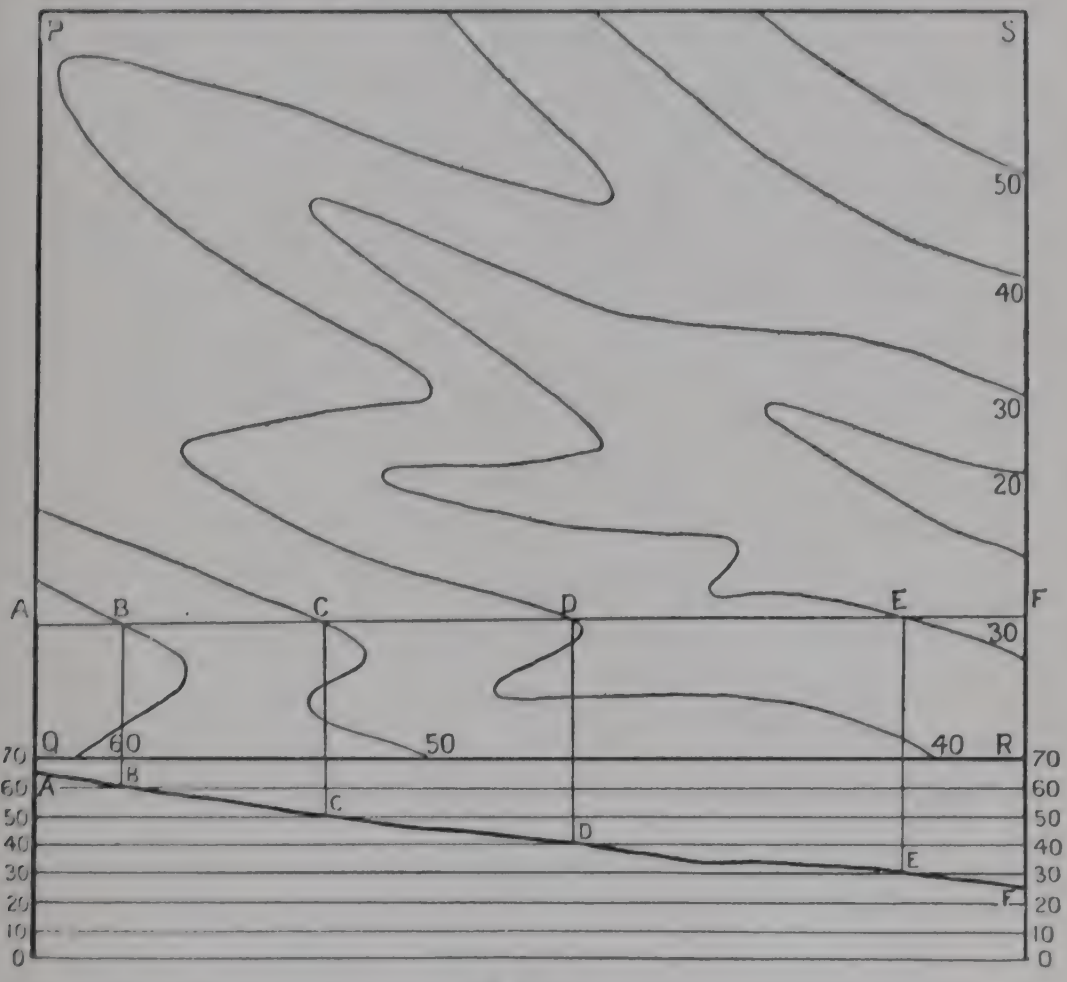

FIG. 5.

ruled line marked 40 feet. From I draw a line to I′ on the ruled line numbered 30 feet. Draw lines from M and N to M′ and N′ on the ruled line numbered 50 feet. The line joining these points gives us the section we want. But how are they to be joined? We cannot tell without looking back to Fig. 2, where both observations and contour lines are given. G is about 44 feet high, and knowing this we can draw the line

through G′, H′, I′, and J′. How are we to join J′ and K′, which are both on the 40 feet line? If we look back to Fig. 2 we find that the land is 42 feet

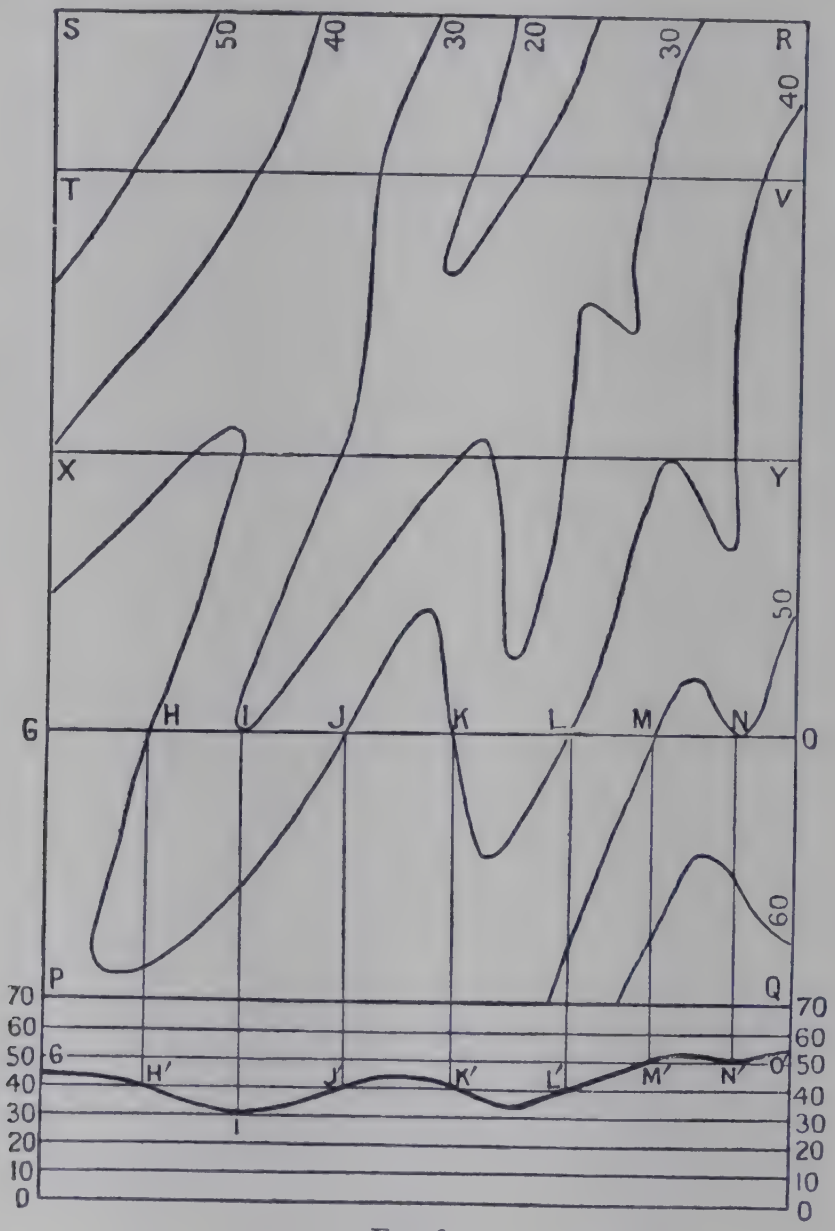

Fig. 6.

high between J and K, so that the section goes a little above the 40 feet line. Between K and L the ground sinks to about 35 feet, and the line joining K′ and L′ must go below the 40 feet line. From the

bottom of this depression the section rises through L′ (40 feet) and M′ (50 feet) to a point between M′ and N′, where it is 53 or 54 feet high. After this it sinks to N′ (50 feet) and then rises slightly to O′, which is about 53 feet high. The section shows that the contour lines represent three low ranges with valleys between.

17. Horizontal and Vertical Scales. The ruled parallel lines used in making the sections are $\frac{1}{10}$ inch apart. $\frac{1}{10}$ inch represents a height of 10 feet, and 1 inch represents a height of 100 feet. The line GO is $2\frac{1}{2}$ inches long. We are not told what real length GO represents. If it represents 250 feet, the horizontal and vertical scales are the same. In both 1 inch represents an actual height or length of 100 feet. If the line GO represents more than 250 feet the vertical scale is exaggerated. If GO represents an actual length of 1,000 feet—in that case 1 inch in the horizontal scale represents 400 feet, but 1 inch in the vertical scale represents only 100 feet. The vertical scale is four times as great as the horizontal scale. If GO represents an actual distance of one mile the vertical scale is exaggerated more than twenty times. In most sections the vertical scale has to be exaggerated.

EXERCISES

1. Draw a section along the line TV in Fig. 6 Refer when necessary to Fig. 1.

2. Draw a section along the line XY in Fig. 6.

CHAPTER III

SEAS, COASTS, AND TIDES

18. The Shallow Seas. The British Isles can be reached only by sea. Thousands of ships sail to our coasts every year. These ships use maps of the sea depths. The mapping of the sea bottom is done by the

Admiralty Department of the Government, which publishes maps called Admiralty Charts.

19. The depth of the seas is found by taking soundings. A heavy lead is fastened to a line and allowed to sink till it reaches the bottom. The quantity of line paid out is known and this gives the depth. Soundings are made at very short distances apart. The figures are written down and the contour lines are drawn in the same way as for land maps. The land below the sea has been mapped as carefully as the land above the sea. It is covered with heights and hollows.

20. Shallow and Deep Seas. Charts show that the seas round England are shallow. Some parts are shallower than others. These are where heights rise above the sea bottom. The most important shallows are the Goodwin Sands off south-east England, where ships often run aground, and the Dogger Bank in the middle of the North Sea. The western seas are shallow for some distance west of the British Isles. Then the sounding lead suddenly goes down to great depths. The shallows, sandbanks, sunken rocks, and other dangers are marked by lighthouses, lightships, and buoys. All these are noted on the Admiralty Charts.

21. The Continental Shelf. The land covered by the shallow seas is called the continental shelf. It is a continuation of the continent which it borders. The British Isles are unsubmerged portions of the continental shelf of Europe. Ships crossing the Atlantic in foggy weather make soundings to find out their position. The sudden shallowing at the edge of the continental shelf shows they are near land.

22. If the seas sank or the land rose 300 feet most of the continental shelf would be uncovered. The British Isles would be joined to Europe. The North Sea would

become a plain, with the Goodwin Sands, the Dogger Bank, and other shallows rising above it as low hills.

23. The Coast-line. The map shows many differences in the coast-line of Britain. The eastern coast-line of Great Britain has unbroken lines and sweeping curves. The only important breaks are the river estuaries and the Wash. The islands are few and small. The western coast is broken into peninsulas and islands. Some of the islands are fragments of old peninsulas formed by the sinking of the land or the rising of the sea. The Isle of Man may have been a peninsula running from the high north-west coast of England. The Scilly Islands are certainly fragments of the peninsula off which they lie. A similar contrast between the east and west coasts is seen in Ireland.

24. Britain has a very long coast-line. Our islands are cut up by the great gulfs of the Irish Sea and the Channel, and by arms of the sea running far into the land. No part of our country is very far from the sea. This has a marked effect on the climate. (See ch. iv.)

25. Sea Fisheries. Currents of warm surface water are blown towards our shores by the Atlantic winds. They make our seas warmer than they would otherwise be. The seas are salter in some parts than in others. The water is least salt near the coasts where the rivers discharge fresh water. Differences in the coldness and saltness of sea water affect the plants and animals of the sea. Sea plants grow best in shallow water, where the heat and light of the sun are most felt. In such places there are rich supplies of the minute creatures on which fish feed. The shallows make the best fishing grounds. Herring, haddock, cod, and other fish are caught in the shallow waters round our coasts. Cod swarm on the Dogger Bank.

26. The Tides. Many of you have seen and the rest have read of the daily movements of the sea which we call tides. Twice a day there is high tide and twice a day there is low tide. The tides round our coasts are affected by the shape of our islands, for the Atlantic tide divides wherever it meets an obstacle. One tidal wave enters the North Sea round the north of Scotland. Another comes through the English Channel. Two tidal waves also enter the Irish Sea. London and some other ports feel the effects of two tidal waves. The flowing tide carries ships up our estuaries and the ebbing tide takes them out. Even steamers with powerful engines feel this advantage, and sailing ships must either wait for the tides or be towed in and out by steam tugs.

27. High and Low Water. Where the tide flows up the narrow channel of an estuary, it becomes deeper and swifter. At London Bridge the Thames is at least 17 feet deeper at high tide than at low tide. At very high tides it is nearly 21 feet deeper. At some of the South Wales ports the difference between high and low water at the highest tides is nearly 40 feet. This deepening of the water twice a day is a great advantage to our ports.

28. When the tide rushes up an estuary it checks the river's current. Sediment is deposited on the bottom of the river bed. (See Vol. I, §§ 33, 35.) Tidal estuaries have constantly to be dredged to prevent them from becoming silted up.

EXERCISES

1. What is meant by the continental shelf?
2. Compare the coast-line of Western Ireland and Western Scotland.
3. Write down and explain any proverb you can remember about the tide.
4. Name some advantages which result from the tides.

CHAPTER IV

CLIMATE AND VEGETATION

29. Climate. Climate is the average weather of a country. To find what this average weather is many different things must be observed for many successive years. Among these are the direction from which the winds blow most often, the highest and lowest temperature for every day of the year, the amount of rain that falls, and when and where it falls most abundantly. These and other things are observed all over the country, and the observations are written down and mapped. The temperature of the air in London has been observed every day for nearly one hundred and fifty years. Some schools make daily observations of the wind, the temperature of the air, the kind of weather, and the amount of rain which has fallen in the last twenty-four hours. We shall speak of the mapping and measuring of these things later. (See chs. xxxiv, xxxv.)

30. Prevailing Winds. Long ago men noticed that changes of weather follow changes of wind. Weather-cocks are the oldest instruments used for observing weather. It is easy to find the direction of the prevailing winds by noticing the direction in which trees grow. Trees which are greatly exposed to the prevailing winds lean away from them. The branches and leaves are not nearly so well grown on the windward as on the leeward side.

31. The commonest winds in our islands are the westerly and south-westerly winds which blow from the Atlantic. They are laden with the moisture which they have taken up from the sea. When they reach the land some of this moisture falls as rain.

32. Mountains and Rain. You know that mountains receive more rain than lowlands. This is because the mountains bar the way and force the winds to move upwards. This brings them into colder layers of air where they cannot hold so much moisture in the form of water vapour. (See Vol. I, ch. iv.) The excess falls as rain. The western parts of Britain have a very heavy rainfall, partly because they are most exposed to the Atlantic winds and partly because they are the highest part of our islands. The rainfall on some parts of the west coast of England is the highest in Europe.

33. The east of England is low. The Atlantic winds do not reach it till they have parted with most of their moisture. The rainfall is not very high. Many differences result from the contrast between the rainfall of eastern and western Britain.

34. Sea and Climate. The climate of Britain is modified by the neighbourhood of the Atlantic ocean in other ways. No part of Britain has winters so cold that the seas freeze. The summers are nowhere oppressively hot. The influence of the Atlantic is felt more or less all over our islands. It tends to make the summers cool for the latitude and the winters warm. (See Vol. I, ch. iv.) This is more marked in the western parts of Britain than in the eastern, and more felt in winter than in summer. (See § 341.)

35. Climate and Vegetation. Vegetation depends both on latitude and elevation. The vegetation zones between the poles and the equator are arranged in an order which depends largely on difference of latitude. (See Vol. I, ch. ix.)

36. Britain lies in the belt of cold or temperate forests. Most of our country was once forested. Oak forests covered the highlands to a height of about

1,000 feet, or rather less in the north. Above these were forests of pine and birch. The highest parts were treeless and covered with grass, heather, and moorland plants. The very highest parts had mosses and lichens only. The moors and higher slopes remain much as they were, but the forests are almost entirely gone. They were cut down for fuel and building material, to form clearings for cultivation, and to make communication easier. Their place is now taken by cities, towns, and agricultural land.

37. Climate and Agriculture. Farming land is either arable land, which is ploughed and sown with crops, or pasture land, which is kept in grass. The high hill pastures are dry and fit only for sheep. The richest pasture land is found in the wetter parts of Britain, and along the banks of rivers which are flooded from time to time. The best arable land is neither too wet nor too dry. It must not be liable to floods, and it must be level enough for ploughing. The crops grown depend partly on the elevation, partly on the climate, and partly on the soil. Speaking generally, most of the pasture land is in the west, which is wet, and most of the arable land is in the drier eastern lowlands.[1]

EXERCISES

1. Write down any proverbs relating to wind and weather. Explain them if you can.
2. Why have mountains more rain than plains?
3. There are several plains in Western England. Compare their rainfall with that of the western mountains and with that of the eastern plains.
4. How does the neighbourhood of the sea affect climate?

[1] Some teachers may prefer to take chapters xxxiv–xxxv next.

CHAPTER V

ENGLISH VILLAGES AND TOWNS

38. The Scenery of the English Plain. Most of our English villages are in the plains, which are left white in the map. There is a quiet beauty in the woods, the green hedges, and the tall elms which fringe the lanes. An English lane is gay in summer with hawthorn, wild rose, honeysuckle and bramble. The rivers of the English plain wind slowly between banks set with willows and wild flowers, through woods, ploughed fields, and meadows kept for hay. An English meadow in hay-time is a lovely sight, with its red clover, white moon-daisies, and yellow buttercups.

39. An English Village. Our prettiest villages are built round a village green. Others cluster round the church or spread along the lanes. The farms and cottages often have thatched roofs. Some are whitewashed, and have strong beams of timber let in. The gardens are bright with flowers. The churches are often old and beautiful. Many have fine old tombs and brasses. In the hillier parts of the country the villages are built of stone.

Near many villages are the allotments. The villagers are often farm labourers, who earn very low wages. They grow potatoes and other vegetables on their allotments after their work is done. A few even grow wheat, which is ground at the miller's, and baked into bread at home. A pig is kept on the allotment to eat up spare vegetables. When fattened it is sold, or made into home-cured bacon.

40. Village Trade. This book was written in a small village. There are only three places in it where money

can be spent. One is the post office, which is a small general shop. The other two are the public-house and the smithy. The blacksmith is a very necessary person in the country, and there is one in almost every village.

How do people get what they want if there are no shops? There is not much buying and selling to do. Labourers who have an allotment, a pig, and a few hens buy very little but clothes. The farmers have their own milk and eggs. The butcher and baker come from the larger villages and the nearest town two or three times a week. A travelling tinker or knife-grinder calls occasionally.

The nearest town is four miles away. People walk in to shop, and either walk back with their parcels or take the train. There is a city ten miles away. The carrier goes there two or three times a week. Cheap market tickets are sold on market days. In these ways people manage to buy what the village shops do not sell. Villages which are not near a railway depend chiefly on carriers. If you cycle through such villages bread and cheese is often all you can buy for dinner.

41. Village Industries. As railways spread villages depend less on themselves and more on the nearest town. They are losing old customs which made life interesting, and forgetting old trades which every one used to know. A few village industries still survive. Lace-making is one of the commonest. Some English laces are very beautiful, but only the older women remember the finest patterns. The industry is dying out, for it takes time to learn. Gloving is another village industry. In some villages round Oxford gloves are made in nearly every cottage. This industry is not dying out. It is quickly learned, it can be done in odd minutes, and it is fairly well paid.

42. An English Farm. A day on a farm would show us many interesting things. We should see the farm-yard, the stables, the horses, the cow-sheds, the calves, the poultry run, the barns where grain is stored, and the rick-yard with its stacks of hay and straw. In the shed where the farm machinery is kept we should find not only ploughs, but machines for weeding the land and for cutting hay and wheat. Threshing-machines go round in harvest time from one farm to another. In the dairy we should find machines for separating cream from milk, and churns for making butter. The skim milk feeds the pigs and calves.

The farm kitchen is often a pleasant place. Everything has been scrubbed and polished till it shines. In some parts of the country great wooden settles are built in round the fire. A gun or two hangs over the chimney. There are rafters from which bacon and other things are hung. The dressers, settles, chairs, china, tall clocks, and brass candlesticks have been handed down from father to son, and are often worth much money.

43. We should walk round the farm and see the fields of wheat, barley, and oats, those in which sheep and cattle are grazing, and the meadows which are being kept for hay. The farmer would say that the cows and horses must have the best grass meadows, and that the sheep are not so particular. He would show us fields of swedes and other roots, which he grows to feed his animals in winter. Root crops have not been grown in this country more than two or three hundred years. Before that many cattle were killed in autumn because there was no fodder. Their flesh was salted and cured as we cure bacon. Few people could afford fresh meat in winter.

When we look at the turnip fields, let us remember what a change for the better they have made in the life of rich and poor.

A hundred years ago, before other parts of the world sent us cheap wheat, English farmers grew more wheat than they do now. Now it pays better in many parts to produce meat and milk than to grow wheat. In the last hundred years great towns have grown up and have to be fed. They can get wheat cheaply from over the seas, but meat and milk are best when they are quite fresh. All over the country much arable land has been turned into pasture, especially near large towns.

44. Fishing Villages. The sea yields a harvest as well as the land. All round our coasts are fishing villages, in which the people look to the sea for a living. Even boys manage an oar, and help with a sail, and look forward to the time when they will be strong enough to go out regularly with the boats. In small villages the fishermen own their own boats and the catch is theirs. Many fishing villages have grown into fishing ports, from which fishing fleets go out. The catch belongs to the owners of the fleet, who send it by quick trains to the large towns. Much fish is dried and cured in different ways.

45. English Towns. Britain is dotted with small market towns (see § 40). These have grown up where roads meet, as, for example, round a ford or bridge.

Most market towns in a farming district sell farming machinery. Many of them make it. Market towns often manufacture produce which the farmers sell. There is always a brewery, and there are often timber yards, flour mills, tanneries, and similar works.

Most of our oldest towns began in this way. Those which were in the midst of a rich farming country

often grew into important cities. Many of these were in districts which produced wool, the earliest of our exports. Many of the towns on the coast were ports as well as markets.

In old days most towns were surrounded by walls and towers. Four streets led from the north, south, east, and west gates to the middle of the town, where stood the church or cathedral. The size and beauty of this depended on the wealth of the Church, and this again depended on the situation of the town. The Church, the king, and the nobles owned nearly all the land. The citizens had to pay for the use of bridges, water, markets, and many other things. For hundreds of years the king, the Church, the great lords, and the citizens struggled to rule the town. In the course of time the citizens gradually bought freedom from their different masters. Then the wealth of the town increased and handsome civic buildings were put up. In many of our old towns there are ancient Guildhalls and Town Halls, and fine city crosses. We often find a castle too.

46. The great manufacturing towns grew up much later. They were often built quickly and badly. They are being rebuilt as fine cities, with handsome public buildings, parks, picture galleries, museums, colleges, and better streets and houses.

47. Place Names. The names of our villages and towns often tell us something of their history. *Chester*, *caster*, and *cester* are all forms of a Roman word meaning camp. Towns with names ending in these syllables were founded by the Romans. The names of hundreds of towns and villages end in *ton* and *ham*. These are old Saxon settlements. *Ham* is a form of our word *home*. The names of many others end

in *ington* and *ingham*. The word *ing* was used as we use *son* to form a family name. A village named Tiddington would be the home of the Tiddings or Tidsons. Names ending in *worth*, *stoke*, *stow*, *fold*, *park*, *hay*, *burgh*, and *bury* are generally Saxon settlements. Many other names end in *by*. These are Danish settlements. *By* or *byr* meant a farm. Scottish children know that cowhouses are still called byres. Names ending in *wick* or *wich* are sometimes Saxon and sometimes Danish. In Saxon names this ending means a village or town. Such towns are generally inland. In Danish or Norwegian names it means a bay or creek in which ships could anchor. The Danish *wicks* and *wichs* are found round the coast. Greenwich and Woolwich on the Thames below London are examples.

Our county names are also interesting. Westmoreland is a descriptive name, meaning the land of the west moors. In the same way Northumberland means the county north of the Humber. Others bear the name of foreign invaders. Norfolk, Suffolk, Essex, Middlesex, Sussex refer to Angle and Saxon invaders. Cumberland and Kent keep the names of the older inhabitants of the land. Most of the other counties are named from their chief towns, many of which are over a thousand years old. The Scottish and Irish county divisions are more modern.

Exercises

Describe any village you know well. Say what its geographical position is, and show how this affects the kind of work done. Find what shops there are, and what you could buy. Does the village make anything to sell? Find out the nearest towns, and what they do for the village. Is your home a manufacturing town? If so, what does it manufacture? Where does it get its supplies from?

FIG. 7. MAP OF LONDON

This map shows the 50, 100, 200, 300, and 400 feet contour lines. Notice the many streams flowing into the Thames. These are nearly all built over, but have left their names to districts. The oldest settlement was on the hill between the Hole Bourne and the Wall Brook (W. B.), where St. Paul's now stands.

CHAPTER VI

LONDON

48. London Bridge. Look at the position of London on the coloured map and on the map in Fig. 7. It stands on the Thames where it begins to widen out to the sea. London Bridge stands where the first bridge was built across the tidal Thames. The tide runs many miles inland above the bridge. If we look east down the river from London Bridge we see the Tower Bridge, the latest of London bridges, with the Tower near it on the north bank. The docks begin below the Tower Bridge. Looking up the river we see the dome of St. Paul's Cathedral. The shores are lined with warehouses both up and down the river.

49. The Site of London. Why was the first London Bridge built here? Looking down stream two thousand years ago we should have seen the Thames winding to the sea across broad marshes. Two or three miles inland there were low hills. At high tide the river flooded the marshes to the foot of these hills. At low tide it left the mud and marsh bare. No village or bridge could be built there.

This broad belt of marshes was interrupted only at one place, where the hills on the north overhung the river. The map in Fig. 7 shows the 50 feet, 100 feet, and 200 feet contour lines. We see that London Bridge was built where the 50 feet contour line comes near the river on one side, and where the belt of marshes was narrow on the other. Here the river was narrow enough to be bridged. Higher up it widened and the marshes began again. There were many marshy islands in this broad sluggish river. These are now joined to the

mainland. Many of the riverside districts of modern London have names ending in *-ea* or *-ey*. This was a Saxon name for an island. Battersea, Chelsea, Putney, and Bermondsey are examples.

50. The City of London. The City of London grew up round London Bridge. It is easy to see why. The ships which came up the river could not go above the bridge, but had to unload and sell their cargoes. Goods were sent to London Bridge from many parts of the country to be put on board ships bound for foreign parts. Travellers from north and south crossed the river here, and needed inns, food, horses, and many other things. All this brought much work and employed many people. From a small bridge-port London grew into the greatest trading place in the world.

51. Westminster. London grew up round the bridge. Westminster grew up upon an island in the Thames where the river was broad and shallow enough to be forded. Westminster Abbey stands on land which was once covered at every high tide. Westminster Bridge is less than two miles from London Bridge by the river.

52. The kings preferred Westminster to London. At any rate they built their palaces there. The king sat in the Palace Hall judging cases and making laws. We see the result of this to-day. The Houses of Parliament are in Westminster, and so are the War Office and many other Government offices. Westminster Hall is all that remains of the old palace. The present Houses of Parliament were built less than a hundred years ago.

53. Modern London. Modern London has grown up round the City of London, or the City, as we now call it, and Westminster. The City is still the business quarter near the bridge. The Post Office, the Bank of

Photochrom Co.

FIG. 8. THE TOWER OF LONDON AND THE TOWER BRIDGE

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FIG. 9. THE HOUSES OF PARLIAMENT AND WESTMINSTER ABBEY

England, the Exchange, the markets, and the great shipping and insurance offices are still there. Westminster is the centre of government.

London has always been the place where all the roads of the country met. The great railway lines meet there too. Every century has made London greater and increased its trade. The river is now lined by miles of docks, and these are not enough. London has more people than any other city in the world.

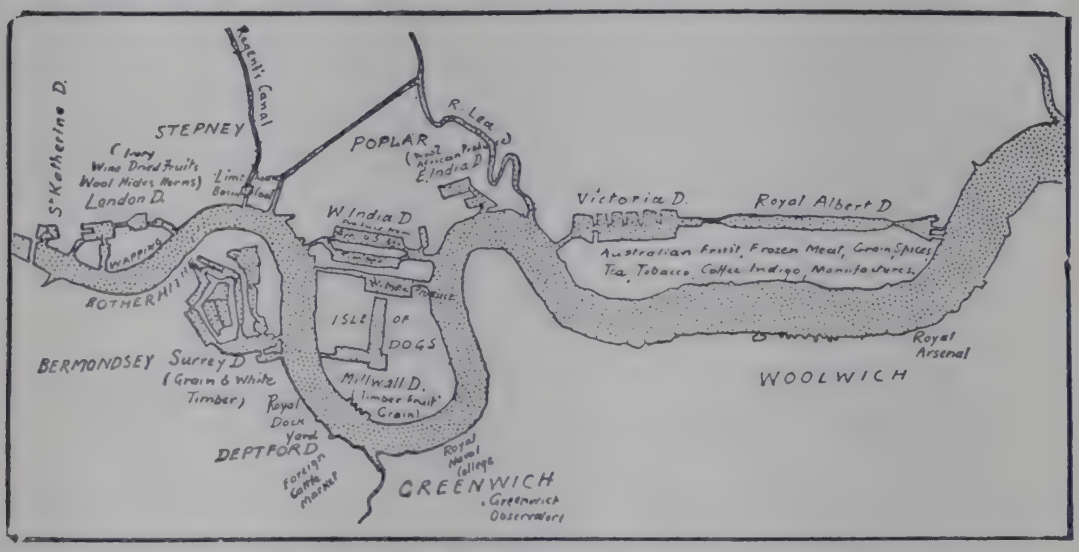

Fig. 10. London Docks and the Commodities brought to them

Most of the working-class districts lie along the river below London Bridge. We often call them the East End. The land on which they are built was marsh before the river was embanked. Many of the occupations are connected with the river and its trade. Much labour is employed in taking cargo out of the ships. The map in Fig. 10 shows what goods go to the different docks. Special trades grow up in the districts round. Palm oil from West Africa goes to the East India Docks, and so soap is made in the neighbouring district of West Ham. Cattle are landed at Deptford, and such trades as tanning, glue- and leather-making

are carried on in Deptford and Bermondsey. Other industries are often started in the riverside district, because labour is cheap. Lower down the river more skilled labour is required in the many electrical and engineering works, and in the industries connected with the arsenal and dockyard at Woolwich. A little above Woolwich is Greenwich with its famous Observatory.

The rich live in the West End, north and west of Westminster. Many reasons have helped to make this the fashionable quarter. The kings have always lived there, at Westminster Palace, the Palace of St. James, and now at Buckingham Palace. The royal parks make it a pleasant part of London. It is a healthy district, for it is higher than the land near the river. Lastly, the west winds blow the smoke and smells of East London away from it and not towards it. Most of the theatres and all the finest shops are here. The museums are not far away.

The middle class cannot afford to live in the fashionable quarters, nor are they obliged to live near the river like many of the working classes. They live chiefly on the outer fringe of the richer quarters and on the heights north and south of the river. They go in by train or tram to their work in the City or the West End every morning.

54. Commercial Advantages of London. London has grown in this way because it is the bridge-port of a great estuary. The importance of this estuary is increased by the fact that it is easily reached from most parts of the world. It opens to the seas of Northern Europe and it is not far from the Channel, which leads (1) to the Atlantic Ocean and the ports of Africa and the New World; and (2) to the Bay of Biscay, the Strait of Gibraltar, and the Mediterranean Sea, on the short sea route to the Far East and the Pacific.

All these parts of the world use London as a central market and place of exchange. Much merchandise is brought to London to be reshipped to other countries.

55. London depends for its existence on the outside world. Its coal is brought by rail, sea, or canal. Its wheat and meat come from overseas. Special trains bring in each day's supply of milk, butter, and fish. Fruit and vegetables are grown in all the villages round. Every day ships come up the river with costly things to eat and wear. (See Fig. 10.)

EXERCISES

1. Colour the contour map of London (see § 13), leaving land under 50 feet uncoloured.
2. Draw a section along the line PQ (from Hampstead to Dulwich).
3. Describe the situation of London and its advantages.
4. Why was Westminster Abbey the West Minster? Where was the East Minster?
5. Is London a good place from which to reach other parts of England? (Look at the coloured map.)
6. Mark London on the map on p. 39. (Cf. Fig. 7.)

CHAPTER VII

FROM LONDON TO OXFORD

56. Map Studies. The coloured map and the map in Fig. 11 show the Thames from its source to near the sea and its most important tributaries. The land drained by these rivers is the Thames basin. The edge or rim of this basin is the belt of higher ground in which the main stream and the tributaries rise. It is dotted in Fig. 11. It is called the water-parting or the watershed or the divide between the Thames and other rivers. The rain which falls on the land within

the dotted line marking the divide flows at last to the Thames. The divide is of different heights in different parts. In Fig. 11, which gives the contour lines for every 200 feet, we see that some tributaries of the Upper Thames rise at a height of over 800 feet. This is the height of part of the divide between the Thames and the Severn. Many tributaries of the Lower Thames rise at a height of between 400 and 500 feet. There the divide between the Thames and other rivers is much lower.

In the coloured map the land over 300 feet high is coloured brown. The names of the different masses of high land are given on it. In Fig. 11 the land under 200 feet is shaded, and many towns are marked. Both maps show the Upper and Lower Thames valleys clearly. Trace the main stream and its tributaries to their sources and note the height at which they rise.

57. The Thames. From London to Reading the Thames is a fine waterway, but it winds too much for roads or railways to follow it. Small streams flow to it from the heights to the north and south. In passing west from London by rail or road we cross some of the streams from the north. We do not see the river itself till we are several miles from London.

As we go west by the Great Western Railway the river and the line approach each other. To the south we see Windsor Castle. It is built on a hill round which the river winds. Windsor Forest is part of the great forest which once covered England.

Soon after Windsor we cross the Thames, which then winds north of the line. Hills come into sight on the right. On the coloured map they are shown as a brown band stretching from south-west to north-east. At the foot of them is Reading.

58. Reading. Reading is built where the Kennet enters the Thames. The Kennet has flowed almost due east, in a long valley with hills on each side. The town is built on the level ground between the two rivers. It is a confluence town, that is, a town built where one river joins another. This is always a good position. At least three roads meet there. Two of these are up and down the main stream. The other is up the valley of the tributary. Reading commands the roads from the west by the Kennet, the routes to and from London by the Thames, and routes from the Channel to London. It is a busy market town and carries on many manufactures. The biscuit works are well known.

59. The Thames Gap. Before long the train goes through a cutting. Cuttings are made through low hills to save a heavy climb. They show us the rock of which the hills are made. The rock in this cutting is dirty white. It is a soft rock, for great lumps have fallen down and lie beside the line. This soft whitish rock is chalk. All the hills which shut in the Lower Thames Valley are chalk. South of the Thames they are called downs. Round London the chalk is buried beneath a thick layer of London clay.

After passing Reading there are chalk hills on both sides of the line. Those to the north-east are the Chiltern Hills and those to the south-west are the White Horse Downs. Both are part of a belt of chalk heights which run north-east across England from the Channel to the North Sea. The valley between them is quite narrow. The line is passing through what is called a gap. Gaps are breaks in the hills made by a river valley. They are very useful, for roads and railways can be taken through them. The gap in which the Thames passes through the chalk belt is called Goring Gap.

FIG. 11. CONTOURED MAP OF THE THAMES AND THE SURROUNDING COUNTRY

The dotted line shows the divide between the Thames and other rivers. The circle shows land within fifty miles of Oxford. The contours are drawn for every 200 feet. Land below 200 feet is stippled.

60. The Chiltern Hills. The contour lines in Fig. 11 show that the Chiltern Hills sink gently to the valley of the Lower Thames, and steeply to that of the Upper Thames. They can be crossed by following the deep steep-sided valleys which lead far across them. Old market towns have grown up in most of them. Railways have been built in the valleys. Near London the villages and towns are becoming suburbs of the capital. The highest parts of the Chiltern Hills are covered with beech woods and short dry grass on which many sheep are grazed.

61. The Upper Thames Valley. At the western end of Goring Gap the line leaves the hills and enters the valley of the Upper Thames. The line to Oxford does not follow the winding river, but takes a short route by Didcot, and sends branch lines to the river towns. Above Oxford the Thames receives many tributaries from the Cotswold Hills. These are part of another belt of heights which runs across England from south-west to north-west parallel to the chalk belt. This belt consists of limestone. (See ch. xi.)

62. The Situation of Oxford. The coloured map shows that Oxford stands almost in the centre of a lowland which separates these two belts. The city is built where (1) the Thames valley is narrowed by low heights which break up the lowland into fertile vales, (2) where the Cherwell enters the Thames from the north, and (3) near the confluences of two tributaries from the Cotswolds. (See Fig. 11.) Oxford is thus a centre of routes leading in many directions.

The Thames Valley is marshy round Oxford. Much of the land is clay, through which water does not pass, and the slope of the land is slight. The river divides into many channels. One road into Oxford is called

H. W. Taunt & Co.

FIG. 12. OXFORD

This shows Oxford with the hills to the west. The Thames is flowing at their foot. The street is High Street leading from the bridge over the Cherwell to the centre of the town, where it meets the three other main streets.

Seven Bridges Road, because it crosses several channels of the river. The name Oxford shows that the river was forded there long before a bridge was built. The marshes and winding channels helped to defend the city which grew up round the ford and the later bridge.

63. The Cherwell rises in low hills thirty miles to the north and flows due south to the Thames. By following its valley and crossing the divide, it is easy to reach the Warwick Avon, which flows to the Severn. The divide between the Thames and the Severn is here under 500 feet.

64. Oxford. Oxford is an old city with four main streets which meet in the centre of the city. The street running south leads to a bridge over the Thames. The street running east leads to a bridge across the Cherwell. The old streets are very narrow. A Saxon church, which is at least a thousand years old, stands in one. Gabled and timbered houses stand beside modern ones. Part of the old walls and towers remain. The cathedral is built on the slope of a hill which rises above the left bank of the Thames. The castle is built farther west just above the river.

When there is a castle in any city try to find out why it was built there. The map will generally show why. Oxford Castle was built to defend the crossing place of the Thames on the main route between Central England and London. This went by the valleys of the Cherwell and the Thames.

Oxford is our oldest university. Its colleges were built by men who loved fine architecture. No two are alike, but each has its own beauty. There are Gothic windows, towers and spires, pinnacles and turrets, quiet cloisters, woodlands among which the deer feed, and lovely gardens. One of the most beautiful is surrounded by the old city wall.

65. Oxford as a Market Town. Oxfordshire is a farming county. Cattle are grazed in its low river meadows and sheep on its hills. Much land is ploughed and cultivated. Oxford is the market town for a large district. Once a week there are large sales of sheep and cattle which have been sent in from the farms round. There are many seedsmen's and ironmongers' shops near the centre of the city, which is the business quarter.

EXERCISES

1. Colour the land in the basin of the Thames in the way described in § 13. Leave the land under 200 feet as it is.
2. Describe the situation of Reading and its advantages.
3. Why does the line not follow the river between Goring and Oxford?
4. How high is the floor of Goring Gap? How high are the hills on either side? (See Fig. 11.)
5. About how high is the Thames Valley at Oxford? How much does the river fall before it reaches the sea?
6. Describe the situation of Oxford and its advantages.

CHAPTER VIII

THE WESTERN CHALK DOWNS

66. Map Studies. Compare the map in Fig. 11 with the coloured map. The circle drawn on it shows the country within fifty miles of Oxford. This contains the source of the Thames, its chief tributaries, the main stream as far as London, the Chiltern Hills, the White Horse Downs and some of the southern Downs, the Warwick and Bristol Avons, the lower Severn, the Clent Hills, and the upper courses of the rivers flowing to the Wash. Oxford is a good centre from which to see many parts of England.

67. The Downs. Let us first go southwards to the Channel. A railway from Oxford crosses the White Horse Downs to the Kennet Vale. Chalk hills rise on both sides of this broad valley. Inkpen Beacon, on the southern side, is over 1,000 feet high. It has the smooth rounded slopes of all chalk hills. From the top we look northwards over woods and meadows to the White Horse Downs, and north-eastwards to the Chilterns. To the south-east and south-west the Downs roll south to the Channel.

68. Beacon Hills. In old days news of danger was spread by lighting fires on beacon hills. Beacon hills were chosen because they could be seen for a long distance. Inkpen Beacon was very well placed. If an enemy's ships were in the Channel the beacons along the Channel and the southern Downs were soon ablaze. These were seen from Inkpen, which lit its beacon fire. The light of Inkpen was seen on the Chilterns and the White Horse Downs. The Chilterns roused Eastern England. The White Horse signalled to the Cotswolds and the hills of the west.

69. Gaps and Gap Towns. The Kennet rises in the western part of the White Horse Downs. The source of the Wiltshire Avon is not far from the Kennet. Find it on the map. Its valley is cut deeply through that part of the Western Downs which is called Salisbury Plain. It forms a gap like Goring Gap. Salisbury is built at the southern end. There are many gaps in the chalk ranges. Towns grew up at the ends of them and many have become important.

70. The Scenery of the Downs. The scenery is of the same type in all chalk districts. The hills are smooth and rounded. Deep valleys are cut into them. The slopes of the Downs are covered with a fine turf on

which it is pleasant to ride or walk. Many sheep graze on it, and many racehorses are trained over it. This turf covering is very thin. If we kick up a clump we see the white chalk below. Curious figures of men and animals have been cut out on the hill sides in different parts of the Downs. Their great white shapes can be seen for miles. Here and there, especially where there is clay or gravel, beech woods are found.

71. In rain, or at nightfall, or in the winter storms, the Downs are bleak and terrible. The rounded hills all look alike. A traveller easily loses his way. In a snowstorm he may lose his life too. The rhyme tells us :

'Tis a terrible thing to be caught in the rain
When night 's coming down on Salisbury Plain

Salisbury Plain is a high level plain or plateau, sloping from a high northern edge to the hollow in which Salisbury lies. On the plateau there is a great permanent camp where part of our army is trained.

72. Chalk is a rock through which water passes easily. The rain which falls on the Downs sinks through the chalk and seems lost. It is not really so, for it finds its way underground to the clay at the base of the Downs. There it gushes out in streams and springs, and gives rise to a line of towns and villages. Some of the valleys are dry only in summer, and have small streams in the winter or after very heavy rains. A line of villages is often found in the valleys of these 'winterbournes'.

73. Early Man on the Downs. To-day men graze sheep on the hills, but their homes are in the valleys or along the base of the Downs. This was not always so. Our earliest forefathers feared the plains and valleys because the forests were full of wild animals. They hunted there during the day, but at night they went back to their hill forts on the Downs. On these

wide and often treeless hills they built their temples, fought their battles, and buried their dead.

Let us picture how they lived. No doubt they knew and used the winterbournes. They also stored water in simple reservoirs called dewponds. They made these by digging hollows in the chalk and lining them with clay. In these dewponds they caught rain and dew. They ate the flesh of the animals they killed and dressed in their skins. They used the bones for needles and the

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FIG. 13. STONEHENGE
Stonehenge is older than our written history, and we cannot be sure of its age or meaning.

sinews for thread, as people still do in some parts of the world. They made their tools and weapons of flint. This is a rock found in chalk. It splits into sharp flakes. They chipped and ground these flint flakes into arrow-heads, axes, knives, and other things.

74. Stonehenge. The Downs are covered with traces of early man. It may be the turf wall of an old camp, or a grave, or a flint arrow-head dropped long ago. On Salisbury Plain is the great stone circle of Stonehenge, which may be an old temple.

75. Salisbury. Find Salisbury in the map. It is built in a hollow at the southern end of the Wiltshire Avon gap, where several valleys open to the Avon. In the distance the Downs stretch north, east, and west. Salisbury became important partly because of the trade in wool and partly because so many roads met there. The tide brought ships up the Avon too. The beautiful cathedral shows how rich the city became. The spire is nearly as high as the Downs around and can be seen from them for many miles. Only barges come up the Avon now. The ships of early days drew very little water. Modern ships draw much more. The change has ruined many old ports on the south coast of England. These decayed ports nearly always have fine churches.

The Wiltshire Avon flows to the large shallow harbour of Christchurch, which was once a port. The town is named from its splendid church.

76. The Occupations of the Downs. The dry pastures of the Downs are well suited for sheep, which produce good wool and famous mutton. In the days of our Plantagenet kings wool was a very valuable English export. Most of the king's revenue was raised by taxes on it. The towns near the sheep-rearing districts grew rich as wool markets. Salisbury was one of these. Later, wool began to be manufactured where it was grown. Many small towns near the Downs still make stuffs and carpets. The valleys form pasture and arable land.

EXERCISES

1. In Fig. 11 colour those parts of the Downs which are drained to the English Channel. Use § 13 to help you. Leave the land under 200 feet as it is.

2. Draw a section of the Downs along the line joining Oxford and Salisbury.

3. Is it easy or difficult to reach the English Channel from the Thames? Give your reasons.

4. Why did Salisbury grow into a large city?

CHAPTER IX

THE EASTERN DOWNS AND PLAINS

77. The New Forest. Standing on the edge of the Western Downs we should see a plain stretching to the sea, and the hills of the Isle of Wight in the distance. We should also see the trees of the New Forest east of the Wiltshire Avon. Wild ponies gallop through its glades, and droves of pigs fatten on its acorns. Its sandy soil is covered with pine trees and heather. A railway runs through the forest and on through more sand and pines to Bournemouth. Still farther west is Weymouth, on a fine bay shut in by Portland Bill.

78. Isle of Wight. On the east of the New Forest is the estuary of the Itchen, which is called Southampton Water. The Isle of Wight guards the entrance to it. This island has a warm climate and is very fertile. It is strongly fortified to guard the straits of the Solent and Spithead, which lead from the Channel to Southampton Water.

79. Southampton. The tides come up Southampton Water through both straits. (See § 26.) This causes four tides a day instead of two. These tides bring ships from all parts of the world to Southampton at the head of Southampton Water. Its importance as a port grows every year.

80. Winchester. In old days invaders often came up Southampton Water with the tide and pushed inland to Winchester. It lies in the narrow Itchen valley which is deeply cut in the Hampshire Downs. Winchester was once the capital of England. Many historic scenes have taken place in its cathedral. where Saxon, Danish, and Norman kings are buried.

81. Portsmouth. Portsmouth is one of the finest harbours on the south coast. It opens to Spithead. The Isle of Wight defends it against storms and invaders. The hills north of Portsmouth are also strongly fortified. The harbour is large enough to hold all our navy. Portsmouth is our naval head quarters. Large battleships are built there.

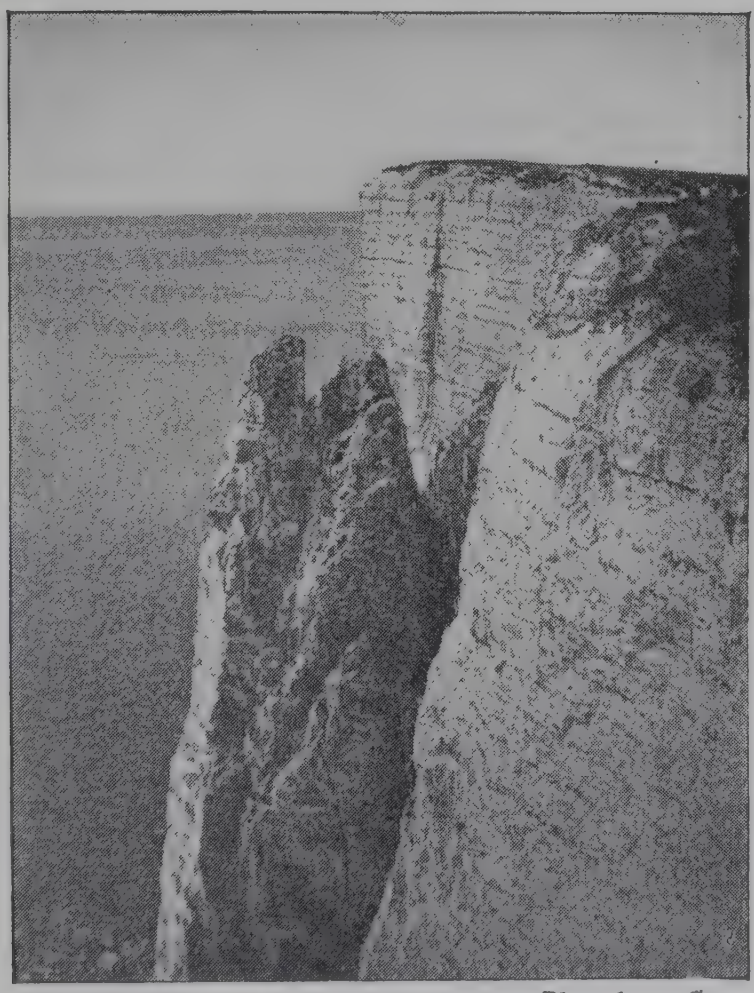

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FIG. 14. BEACHY HEAD

82. The South Downs. Find the South Downs in your maps. They run eastwards and reach the coast at Beachy Head, where great white cliffs fall several hundred feet to the sea.

83. Several short rivers have made gaps through the South Downs. Lewes and Arundel at the southern end of two of these gaps had strong castles. Ports grew up on the estuaries. Newhaven, at the mouth of the Sussex Ouse, is a port for steamers crossing the Channel to France. Brighton is a fashionable town.

84. View from Brighton Downs. Brighton is built where the South Downs reach the sea and form cliffs. The view from the top of the Brighton Downs helps us to understand the map. We look north over the woods, meadows, cornfields, vales, and hills of the Weald, to the distant North Downs. Make out this view on your maps.

85. The Weald. The North and South Downs both rise very steeply on the side facing the Weald. The name Weald means wood. Forests once covered the plains and hills between the North and South Downs. The iron ore of this district was formerly smelted with charcoal. The forests were cut down for fuel and the cleared land was cultivated. Between the forested ridges of the Weald and the North Downs is the fertile Vale of Kent. This is covered with orchards and hop gardens. The North Downs reach the sea at Dover. They form great white cliffs like those of Beachy Head. Between Beachy Head and Dover Cliffs are many small ports and large watering-places, such as Eastbourne, Hastings, and Folkestone.

86. Changes in the Coast. This part of the coast has changed greatly in the last thousand years. Slice after slice of the chalk cliffs has fallen into the sea, carrying down houses and churches. In other parts the tides and current have built new land, as Romney Marsh. Some old ports are now inland towns. Others are buried beneath the Channel.

87. Dover. Dover is built where England and France are nearest. On a clear day the white cliffs of Calais can be seen twenty miles away. Dover also guards the passage from the Channel to the North Sea. It is one of the most important places in Britain. Millions of pounds have been spent in making an immense harbour, able to take the largest battleships afloat.

88. Canterbury. Canterbury is built at the northern end of the Stour gap through the North Downs. It is on the main route between Dover and London. It was a great place in Roman times. Roman missionaries preached Christianity there. The cathedral is a magnificent church towering high above the city. The archbishop is the spiritual head of the English Church and has authority over all clergy in his province.

89. To London. We might sail from Dover along the Kentish Coast and up the Thames to London. The North Downs are not far inland and sometimes reach the shore as white cliffs. There are low chalk cliffs along the so-called Isle of Thanet. Ships once went through a channel between Thanet and the mainland to shorten the distance to London. Ramsgate is a harbour of refuge. Margate, on the north of Thanet, is one of London's holiday resorts. The sail up the Thames gives us some idea of the oversea trade of London, and of the immensely strong defences which guard the capital.

EXERCISES

1. Can you explain why Winchester was once the capital of England?

2. Describe the situation of Southampton and its advantages.

3. If you stood on the top of the North Downs and looked south or south-east, what kind of view would you see? Use the map to find out.

4. Why is Dover one of our most important naval ports?

FIG. 15. THE NORTH AND SOUTH DOWNS, WITH THEIR GAPS

Land under 200 feet is stippled. The contour lines are drawn for every 200 feet. The dot-dash line shows the Thames divide.

CHAPTER X

THE CHALK GAPS

90. The Road to London across the Downs. Take the coloured map and trace the North and South Downs westward to the Hampshire Downs. These are continued by the Berkshire Downs to the north and stretch west as the Western or Wiltshire and Dorset Downs. Figs. 11 and 15 give their contour lines for every 200 feet and show where they are steepest.

These chalk ranges are barriers between the Channel and the Thames. This makes the chalk gaps very important, and the modern roads and railways from London to the Channel go through them. In olden times the main roads ran along the North and South Downs, because the forested Weald and the marshy land near the Thames was difficult to cross.

91. How the Chalk Gaps were made. How were these gaps made? How can rivers run right through ranges of hills? How did the Thames cut a gap at Goring, or the Avon through Salisbury Plain? How is it that the rivers which rise in the Weald south of the North Downs flow north through the North Downs, and that the rivers which rise north of the South Downs flow south through the South Downs? The answer is that these gaps were not made after the North and South Downs, but at the same time. The Weald rivers had already taken their direction north and south before the Downs were raised. The rivers kept the same direction, though the land over which they flowed was slowly rising. This rising was so gradual that the rivers had time to deepen their river valleys as quickly as the land rose. If the

Downs had risen faster than the rivers cut their valleys the rivers would have altered their courses, for they could not flow uphill. As the Weald rivers now flow through gaps in the Downs we see that this did not happen.

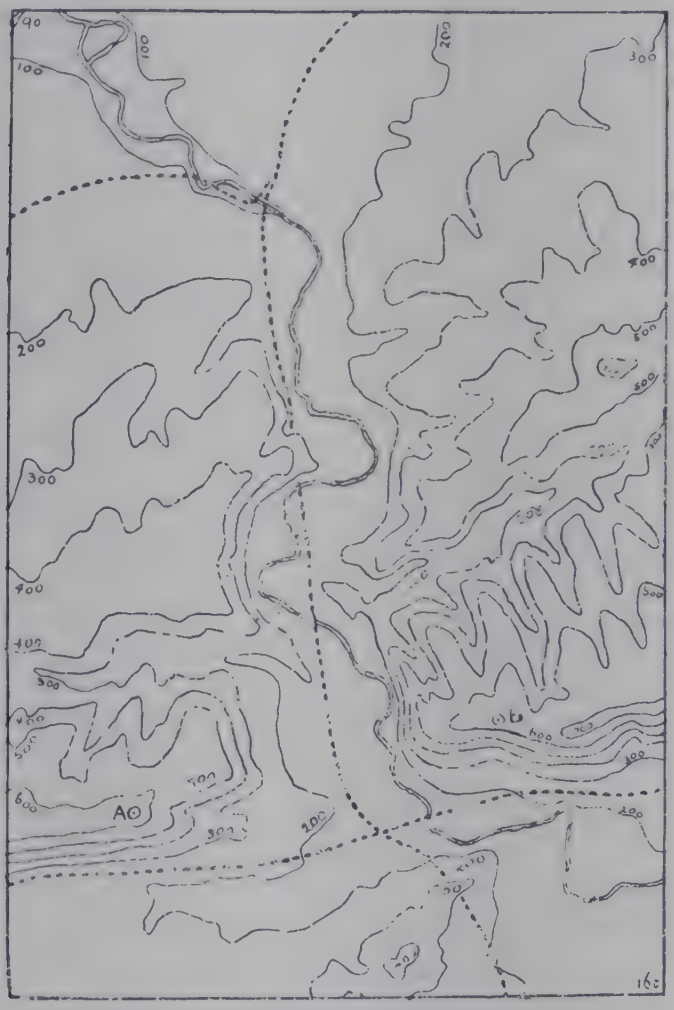

FIG. 16. DORKING GAP
The contour lines show that it opens an easy way between high hills for the dotted railway line.

92. The Gaps of the Downs. Fig. 15 shows the gaps in the North and South Downs. You see that the Arun gap in the South Downs leads to the Guildford and the Dorking gaps in the North Downs, and that the Ouse gap in the South Downs leads either to the

Dorking or the Medway gap in the North Downs. The gaps of the North Downs guard the immediate approaches to London. The Medway gap is the most important of all. Maidstone, the chief town of the Vale of Kent, is built at its southern end. Rochester, with its cathedral and castle, is at the northern end, where the Medway estuary opens to the Thames. On the same estuary is Chatham, with dockyards, arsenals, and everything needed for the defence of London. The entrance to the Medway is guarded by Sheppey Island, on which is Sheerness dockyard.

EXERCISES

1. Colour the North and South Downs and the Weald in Fig. 15, according to the directions in § 13.
2. Colour the figure of Dorking Gap in Fig. 16, leaving the lowest land white.
3. Why has Rochester grown faster than Maidstone ?

CHAPTER XI

THE COTSWOLDS

93. Map Studies. The coloured map shows that north of the Thames three lowlands and two belts of hills run from south-west to north-east. The most easterly high belt forms the chalk heights which we have traced through the White Horse Downs and the Chiltern Hills. They are continued by the lower East Anglian Heights, which end in cliffs under 300 feet high on the north coast of Norfolk. (See ch. xiv.) The second or western high belt forms the limestone ridges of the Cotswolds and the Northampton Heights. These parallel ridges are often called the scarplands, because they fall steeply on one side to a vale below. (See § 96.)

Between the two is the lowland belt consisting of the Upper Thames vales, with Oxford as the centre (see § 62), and of the plains drained to the Wash. The other two lowlands lie east of the chalk and west of the limestone ridges. The first forms the Vale of the Lower Thames and the plain of East Anglia, with London as the centre. The western lowland belt forms the vale of the Severn and of the Warwick Avon which opens north to the Vale of Trent. (See ch. xix.)

Each belt has its own character. The chalk has its special type of scenery and occupations. (See ch. viii.) The Cotswolds are a type of the limestone belt. The lowlands are composed mainly of clay. (See § 62.) The land near the rivers which is often flooded is in meadow grass. The land above the flood limit is cultivated. The towns are mostly small market towns with a few larger manufacturing ones. Their industries are often of long standing and generally began because the raw materials (wool for cloth, hides for leather boots, clay for bricks) were produced near.

In the map in Fig. 11 the contours of the Cotswolds are drawn for every 200 feet. Notice how close the contour lines are on the west. This shows a very sharp rise indeed. On the east the contour lines are much farther apart. This shows a much more gentle slope to the Upper Thames.

Many streams flow from the Cotswolds to the Upper Thames. The first to enter above Oxford is the Evenlode. The next is the Windrush. Their deep steep-sided valleys lead far into the Cotswolds. The Evenlode almost cuts a gap across them.

94. The Cotswolds. The Cotswolds are both broad and high. In the west they rise steeply nearly 1,000 feet, or almost a quarter of a mile, above the Vale of

Gloucester. The easiest way to reach the Severn from Oxford without crossing the highest part of the Cotswolds is by the Cherwell and the Warwick Avon which flows into the Severn at Tewkesbury. This part of the divide is not very high and the route is easy but long. Shorter but more difficult ways follow the valleys of the Cotswold tributaries of the Thames to the divide between the Thames and the Severn, where it is about 800 feet above the sea. Such routes lead past fine old towns at the valley mouths. These prospered in the days of the Cotswold wool trade. The largest is Cirencester[1], on the Churn, a busy market town with a magnificent church.

95. Across the Cotswolds by Rail. A railway leads through the heart of the Cotswolds. From Oxford it follows the Evenlode valley through pretty hill country. Small towns have grown up where roads meet. Chipping Norton was a busy 'chipping' or market town trading in Cotswold wool. From Chipping Norton Junction the line crosses first to the Windrush and then to the Coln valleys. These are separated by a high, bleak, sheep-breeding region. The highest point of the line is about 800 feet above the sea. From there it descends to Cheltenham, at the foot of the Cotswolds, a town with noted mineral springs. (See § 177.)

96. Cotswold Scenery. From Cheltenham we see the high edge of the Cotswolds rising steeply above the town. Such a sharp fall of high ground to a plain below is called an escarpment or scarp. Fig. 11 shows it as a set of parallel contour lines close to each other.[2] Many things show that this is not a chalk country. There is sheer rock wall instead of smooth rounded

[1] Pronounce Ciceter. Notice the Roman name.

[2] The steep slopes of the downs are also scarps.

slopes. A huge rock chimney stands out from it. (See Fig. 17.) The face of the escarpment is quarried for building stone. This is yellowish in colour and quite unlike chalk. It is called limestone.

97. Some things, however, remind us of the chalk country. There are not many trees, and the beech is the commonest. The turf is short and close like that of the downs. There are few streams or signs of running water. The limestone rock of the Cotswolds also lets water pass through. Limestone soils are thin, dry, and more suited for grass than for crops. Although it is rainier on the hills than in the plains the grass is drier than meadow grass, because the limestone soil holds little water.

98. Limestone not only lets water sink through it, but it also dissolves in water. Caves are often found in limestone regions where underground water has dissolved the rock. Sometimes streams disappear through cracks in the limestone and flow underground till they find a way out lower down. Dry valleys are often found. These have sunk down because the underground water has worn away the rocks below.

99. Limestone makes a bare landscape. Stone walls take the place of green hedges. The houses are built of stone. Often there are none in sight. The Cotswold villages are deep down in the valleys, where wells can be dug to reach the underground water.

100. The Occupations of the Cotswolds. The Cotswolds have always been a wool-producing region. This was collected, weighed, and packed at Cirencester and other Cotswold towns. Later, cloth was made in some of the valley towns. (See § 105.) Other industries have grown out of the wool trade. One was the dressing of skins and the making of gloves. This

By the courtesy of the Great Western Railway Co.

FIG. 17. VIEW FROM THE COTSWOLD ESCARPMENT

Notice the steep escarpment, the rock chimney standing out from it, the broad cultivated Severn Vale, and the Malvern Hills beyond.

is important in the Evenlode valley. Wool is made into blankets at Witney, in the Windrush valley.

Farming is carried on in the valleys. In the highest parts barley and oats will ripen. As the eastern valleys sink to the Vale of the Upper Thames they become wider and more fertile.

101. A View from the Cotswolds. We can climb from Cheltenham to the top of the escarpment in about an hour. Then we are only a mile or two from one of the sources of the Thames.

A wonderful view lies before us. Follow it on the map. The broad Vale of Severn lies below with the hills which shut it in. On a clear day the hills round Ludlow can be seen in the north. Nearer, but still far away, is Worcester Cathedral, rising among the smoke of the town. Worcester makes fine china. Below Worcester the Teme flows in from the Welsh hills. Then our eyes are caught by Bredon Hill in the middle of the Vale. It hides the Avon, which is flowing to the Severn at Tewkesbury. The square tower of Tewkesbury Abbey can be seen among the trees. In front, on the western edge of the vale, the Malvern hills rise steeply from the level plain. They separate the Severn from its tributary, the Wye. At our feet is Gloucester. We can see the high towers and roofs of its cathedral and the long straight Roman road from Cirencester. Below Gloucester the estuary winds away to the Bristol Channel. Hills shut in the view to the south. Smoke is rising from the furnaces of the Forest of Dean on the western side of the estuary. Behind, the Welsh hills lose themselves in the blue distance.

102. Trace all this on your maps. Compare the coloured map with Fig. 11. Then shut your eye and try to picture the view. First think of the broad level

wooded vale with its scattered hills and its cathedrals and abbeys. Imagine the long line of the blue Malvern hills, the streak of sea, and the distant Welsh hills. Try to turn the map into a picture of the country.

Half an hour's walk brings us to Seven Springs, a source of the Thames. The Churn bubbles up as a deep pool under shady trees and flows away towards Cirencester.

EXERCISES

1. In Fig. 11 colour the basin of the Severn in the same way as in § 13. Leave land under 200 feet as it is.
2. Draw a section of the country along the line joining Oxford and Gloucester in Fig. 11.
3. How do the people of the Cotswolds get their living?

CHAPTER XII

THE SOUTHERN COTSWOLDS AND THE SEVERN ESTUARY

103. Gloucester. The road from Cirencester to Gloucester is like most Roman roads. It goes straight from place to place. It descends the steep face of the Cotswolds, falling over 800 feet in less than two miles, and strikes across the flat vale to Gloucester.

Find Gloucester on the map. It is the old bridge-port of the Severn where many roads met. The Cotswolds and the Malverns sent down their wool. The Severn Vale sent farm produce. Many valuable imports were brought in from France and the Mediterranean. All this meant trade and money-making. The many cathedrals, abbeys, and priories, show that the vale has long been rich.

Gloucester was one of the chief towns of the west. It guards the way west into Wales and north up the

Severn. Its strong castle saw much fighting. In plan, Gloucester is like other old cities. The four main streets met at the city cross near the great cathedral.

Gloucester does not rank now as a great port. This is partly due to the tides of its estuary. The map shows how rapidly the estuary narrows. The tidal waters

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FIG. 18. GLOUCESTER CATHEDRAL

are heaped up in the narrow estuary into a high wave which rushes rapidly forward. Most ships use a ship-canal which has been made to overcome this difficulty. Gloucester is not near any important manufacturing district, except that of South Wales, which has good ports of its own. One of its chief imports is timber, which is made into railway carriages.

104. A line leaves Gloucester and turns up the deep narrow valley of the Stroud water, a Severn tributary. The hills on either side are very high.

105. A Cotswold Woollen Town. Stroud, a

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FIG. 19. WOOLLEN MILLS IN THE STROUDWATER VALLEY
The text in § 105 explains this view.

small town which makes cloth, is squeezed into this valley. Flemish merchants began the industry there. They wanted cheap wool, plenty of water to wash, cleanse, bleach, or dye fleeces, and a current strong enough to turn mills. All this they found in Stroud. Wool came from the sheep grazed on the hill-slopes above, and the rivers supplied water and water-power.

106. Stroud is worth more than a glance. The mills are at the edge of the stream, as we should expect. The houses and streets climb the steep hill-sides. Above are the hills, with dry sheep pastures.

107. The Divide. We are now near another part of the higher land, or divide, which separates the Severn streams from the Thames streams. As the line climbs up from the Severn the train goes one way and the stream flows the other. At last the train plunges into a tunnel. When it comes out it is descending to the Thames. It follows the valley of a stream which rises a mile or two away at Thames Head. This is generally taken as the source of the Thames. The line runs downhill between the low wooded Cotswolds and the smooth rounded White Horse Downs till it reaches Swindon.

108. Swindon. There was no town here when the Great Western Railway was built. The railway company bought land cheaply and set up engine, carriage, and other factories. Men came to work in the new 'railway shops'. Houses, food, clothes, and many other things were wanted for the workmen. Swindon grew into a large town.

109. From Swindon we could go on to Oxford through the Vale of the White Horse, named after the huge figure cut on the Downs between Swindon and Didcot. But to see the southern end of the Cots-

wolds we must change at Swindon and take the Bristol train from London which left the Oxford line at Didcot.

110. The Bristol Avon. The Bristol line runs south of the Stroud Valley line. It crosses the low southern end of the Cotswolds and tunnels under them into the valley of the Bristol Avon. Avon is an old name for water. There are many Avons in England.

The Bristol Avon is a Cotswold river. It has cut a deep steep-sided valley through their southern slopes. Bath, with a fine abbey, is built at the lower end of this deep valley or gorge. The line follows the Avon to Bristol at the head of the estuary. Below Bristol the river flows through Clifton Gorge to the sea.

111. The Bristol Channel. The Avon opens to the Severn estuary, which widens to the Bristol Channel, a gulf of the Atlantic. It cuts deeply into the land, and separates England from Wales. Lundy Island lies at the mouth. The currents which run round it have carried many ships on to its rocks. Very strong tides run up the Channel and up the estuaries of the Avon and other rivers opening to it.

112. Bristol. Bristol began in the same way as many other ports. It was the bridge-port of a tidal river. In old days it traded in Cotswold wool and in fish. Bristol fishermen went as far as Iceland. Fish was one of the chief foods when all Europe was Catholic, and when no root crops were grown to feed cattle in winter. Bristol traded with Ireland, and received cargoes from France and the Mediterranean. The discovery of America increased its trade, for it faced the new lands on the other side of the Atlantic. It is one of the chief ports for the West Indies and South America. The largest ships do not come above Avonmouth, at the entrance to the estuary.

Bristol is near a coalfield, and can get cheap coal to supply its factories and ships. Sugar, tobacco, cocoa, and chocolate are manufactured in Bristol. The raw sugar, tobacco, and cocoa come from the West Indies and South America. Many Jamaica bananas are also landed here.

EXERCISES

1. If you have not yet coloured the basin of the Bath Avon in Fig. 11, do so.
2. Draw a section along the line joining Oxford and Bristol.
3. How did Gloucester, Stroud, and Swindon grow up?
4. Which is better situated, Gloucester or Bristol? Why?
5. What advantages have valley towns for manufacturing wool?

CHAPTER XIII

SOUTH-WEST ENGLAND

113. Map Studies. South of the Bristol Avon the highest land forms the Mendip Hills. Beyond is the Plain of Somerset. Devon and Cornwall form the hilly peninsula of south-west England.

114. The Plain of Somerset. The Plain of Somerset opens to the sea on the west, but is shut in by hills on every other side. Sheep are grazed on the Mendip Hills. Their wool is manufactured into West of England cloth in small towns of the Stroud type. At the southern base of the Mendips is Wells, with a beautiful cathedral. Together with Bath it forms the bishopric of Bath and Wells. Both these towns owe their names to their mineral springs, which were visited by the Romans.

115. This part of England receives rain from the Atlantic winds. The grass is fresh and green. The meadows are used for grazing cattle and horses. The

cows fed on the rich grass give very creamy milk, which is made into butter and 'Devonshire Cream'. Wheat is grown in the Vale of Taunton, which is protected by hills from the Atlantic rains.

116. Devon and Cornwall. The east of the hilly peninsula forms Devon and the west forms Cornwall. Most of this peninsula is brown in the coloured map. Where brown meets blue the coast is wild and rugged. Find Exmoor in North Devon and Dartmoor in South Devon. Bodmin Moor is in Cornwall.

117. Exmoor, with Dunkery Beacon, is a high moorland, where deer, sheep, and ponies run wild. The view from Dunkery Beacon stretches from Cornwall to Central Wales—half the length of England—and far over the Bristol Channel, past Lundy, to the Atlantic. Exmoor rises above the Bristol Channel in grand cliffs. Seaside towns have grown up where its lovely glens open to the sea. Ilfracombe is the largest. Thousands of visitors come every summer to admire the purple heather, the deep blue sea, and the great cliffs against which the Atlantic thunders.

118. Dartmoor is higher and wilder than Exmoor. Its rocky hills or tors are nearly as high again as Inkpen. Old graves and stone circles show that Dartmoor was the home of early man.

119. The West-Country Vales. Fertile vales open between these moorlands. The Plain of Devon, between Exmoor and Dartmoor, opens north and south to the sea. On the north the Taw from Exmoor and the Torridge from Dartmoor open to a fine bay by a single estuary. On the south the plain opens to the Channel by the Exe. South Devon is a dairy-farming and orchard country. Devonshire cider is famous.

120. The Exe valley is a fertile part of this plain.

Exeter, at the head of the Exe estuary, is a cathedral city and an old port. The fishing port of Exmouth has become a health resort. (See § 123.)

121. West Country Estuaries. The South Devon estuaries are very important. Dartmouth is a port and coaling-station at the mouth of the lovely estuary of the Dart, from Dartmoor. The Tamar estuary, called the Hamoaze, and the Plym estuary open to Plymouth Sound. Devonport and Plymouth, built on these estuaries, have sheltered harbours in which the largest war, passenger, and merchant ships can lie at anchor.

122. Many other streams make good harbours. All along the north and south coasts fishing villages are built at their mouths. Fishing is all the more important because much of the interior is waste land. Fishing boats of all sizes sail out at night. Small boats have lines with two men to manage them. Larger boats have heavy nets which need several men to haul. Trawlers steam away from Plymouth and from Brixham on Tor Bay and drag great nets through the sea. It is a quick but wasteful method of fishing, for big and little fish are caught together. Penzance and St. Ives in Cornwall have mackerel and pilchard fisheries. Devon and Cornwall lads often become sailors. 'Devon sea-dogs' helped to found our North American colonies.

123. The Devon Climate. The Atlantic winds give Devon and Cornwall a mild wet climate. The South Devon and Cornish coasts lie far south, and are protected from cold winds by the high moors to the north. Delicate people often winter in Torquay and other towns of the South Devon coast. The Cornish towns are growing for the same reason. This beautiful coast is called the 'Cornish Riviera'.

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FIG. 20. DARTMOUTH AND THE DART ESTUARY

Compare this with Figs. 23 and 39, which also show estuaries. In the distance is seen the high edge of Dartmoor.

124. The Scilly Islands. These are rocky islands off the Cornish coast. A few people live on some of them, and grow early flowers for the London markets.

EXERCISES

1. Colour any part of Fig. 11 which refers to this chapter.
2. Describe the occupations of Devon and Cornwall, and explain why each is important.
3. Why have Devon and Cornwall such mild winters? In what ways is this an advantage?

CHAPTER XIV

EAST ANGLIA

125. Map Studies. Read again § 93. Find the rivers which reach the sea between the Thames estuary and the Wash. They rise in the low chalk East Anglian heights a score or two of miles from the coast. They have short courses over land which slopes slightly to the east. This land is largely composed of clay. The strong tides wear this away and form large irregular estuaries at the mouths of the rivers.

126. East Anglia. In old days sea pirates from the northern coasts of Europe often sailed up these estuaries and pushed inland. The Angles from the opposite shores of the North Sea settled much of this region, which is often called East Anglia.

127. East Anglia consists of three regions. Sheep are grazed on the chalk hills. The land east of them is farmed. The third region is the coast, with fine harbours. Fishing is very important along this coast,

which faces the rich North Sea fishing grounds. Some of the fishing ports are large places of which every one has heard. Others are quite small. The east coast has two advantages. It is near London, and the air is very dry and bracing. This brings many visitors in summer.

128. Estuaries and Bridge-ports. Each of these estuaries has a bridge-port at the head and a fishing-port at the mouth. Chelmsford is the bridge-port of the Chelmer. Its flour mills and tanneries show that wheat is grown and cattle are grazed. Eastern England is the driest part of the country. The soil suits wheat, which bears a heavy ear and likes to root firmly in a clay soil. Colchester, the bridge-port of the Colne, is also the centre of a wheat and grazing country. Its oyster fisheries have been famous since Roman times.

129. The Stour and Yare Estuaries. The Stour and Yare estuaries are both important. The valleys of the streams which flow to them lead some distance inland. The Orwell flows to the Stour, and the Yare estuary also receives a second river.

In both estuaries the fishing-port at the mouth has become important. Harwich, at the mouth of the Stour, trades with the Rhine and Elbe ports. Yarmouth, at the mouth of the Yare, is most important as a fishing-port. It employs many thousands of people. Some go out in the fishing fleet, others work in the fish docks, and the rest are busy in curing and drying establishments.

The bridge-port of the Stour estuary is Ipswich on the Orwell. It is the market for a large region, and has several manufactures. The bridge-port of the Yare is Norwich, built near the confluence of the Yare and a tributary.

130. Norwich. The walls, gates, castle, cathedral,

guildhall, and old houses show that Norwich has a long history. It was built on a navigable river, opening from a wool-producing country towards a wool-manufacturing country on the other side of the sea. First it imported wool to the Netherlands. Then Flemish manufacturers settled in Norwich, where wool was cheap, and established the woollen manufacture. This spread as a cottage industry to the villages round, of which Norwich was the market and port.

131. At length the prosperity of Norwich as a woollen town began to decline. Rent, taxes, and the prices of wool, water, and labour increased. Manufacturers began to move to the valleys opening from the hills in the sheep-farming districts, where they found all they wanted. Wool was cheap, because it was produced there. The rivers supplied water for cleansing and dyeing wool, and power for turning mills. Stroud shows what these woollen towns were like. (See § 105.) Norwich is still a busy place. It is the market and manufacturing centre for the farming country round. Mustard and starch and agricultural machinery are among its manufactures.

Exercises

1. Colour any part of Fig. 11 or of Fig. 15 which refers to this chapter.

2. Describe East Anglia. What are the chief occupations?

3. How did the woollen trade affect the growth of English towns?

4. Why does Norwich manufacture mustard and starch?

5. Use the towns of the Yare and Stour estuaries to show the advantages which result from (1) being farther up the river from the sea, and (2) being near the mouth of the estuary.

CHAPTER XV

THE FENS

132. Map Studies. Find in the coloured maps the Ouse, the Nene, and the Witham, all flowing to the Wash. They flow from the low Northampton Heights across flat land. The limestone Northampton Heights continue the line of the Cotswolds, just as the East Anglian Heights continue the chalk belt. Most of the lower country between them is covered with Oxford clay. (See § 93.) Water collects on clay lands, especially when these have little slope. The flat country round the Wash once consisted of fens or marshes, which were flooded at each high tide. The rivers brought down sediment and slowly pushed the network of marshes farther out to sea.

133. Scenery of the Fens. The Fens are now richly cultivated. A vast green plain, planted with wheat, barley, peas, beans, turnips, and other crops, stretches as far as the eye can see. No hedges break it up, and in many parts not a tree is seen. Fields of mustard make brilliant patches of yellow. In other parts there are acres of strawberries with fruit trees planted for shelter. The fields are separated by ditches or dikes. These contain water which has drained out of the land. Hundreds of long straight dikes have been cut, which cross each other in all directions. The dikes open into drains. Drains are broader and deeper than dikes and are embanked on both sides. The mud is cleaned from the bottom to keep them deep. It is thrown up on the embankments and helps to build them up. The water in the drains is held back by strong sluices, and only allowed to enter the rivers when the

water is low. Near the sea strong sluices and locks keep the tide from passing up the rivers and flooding the country. The rivers no longer wind as they did. Short straight channels have been made to cut off the loops. The Fen rivers are embanked in the same way as the drains.

134. Some things remind us of the Fens as they used to be. There are few villages. Many of the farms have only a few cottages round them. The roads are long, straight, and flat. The churches have very high towers which are seen for miles. Travellers across the Fens needed such landmarks. Windmills were once used to pump water out of the dikes. Many of them are now flour mills.

135. The Fen Towns. There are 'islands' of higher firmer ground among the marshes. These were the first settlements. Many Fen villages have names ending in *y*, or *ey*. (See § 48.) Some 'islands' were Church lands, and monasteries were founded. The monks and their tenants drained the marshes belonging to them and farmed the new land. Meat was less eaten in the England of those days. The monks sold eels and fish from the rivers and wildfowl from the marshes. They grew rich enough to build the fine churches and abbeys of the Fens. Ely and Peterborough have beautiful cathedrals.

136. The position of the Fen towns is interesting. There were ports at the river mouths; e.g. King's Lynn on the Great Ouse and Boston on the Witham. Farther inland were 'island towns'. Ely on the Great Ouse and Peterborough on the Nene were the largest. Many towns grew up on the higher ground round the sources of the Fen rivers. Lincoln on the Witham was the largest and the best placed. Find also Northampton

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FIG. 21. ELY CATHEDRAL

on the Nene, Huntingdon and Bedford on the Ouse, and Cambridge and Bury St. Edmunds on tributaries. Cambridge is a university town whose beautiful colleges and gardens remind us of Oxford.

137. The Occupations of the Fens. Agriculture is the chief occupation. Early potatoes are grown in the South Lincolnshire Fens, and strawberries and other small fruits in the Cambridgeshire Fens. Much jam is made. Boston is a busy port. Its tall church tower, called Boston Stump, is like the fine spires of some Dutch churches. It reminds us that Boston and the Dutch ports, on opposite sides of the North Sea, traded for centuries with each other. Swedish and Norwegian boats unload timber in Boston harbour, and Russian ships bring maize and other feeding stuffs for the famous horses, cattle, and sheep of Lincolnshire. Some coal is exported. (See § 179.) Mustard is made in many of the towns. Brick-making is important at Peterborough, on the edge of the Fens, where clay (see § 132) replaces drained marsh. The town has also large railway shops. Northampton, on the farther side of the Fens, in a grazing country, makes boots. (See § 93.)

138. Lincoln. The low Lincolnshire coast has been drained and farmed in the same way as the Fens.

Lincoln is built where the Witham flows through a gap in the low Lincoln Edge. Fig. 21 makes this gap and the position of Lincoln quite clear. The low Edge, 200 feet high, runs north and south, and the Witham gap cuts it from east to west. In Roman times main roads from all parts of England met at Lincoln. The Roman road to the north climbed the steep slope north of the gap and followed the Edge to the Humber, in order to avoid the marshes of the lowlands.

Modern Lincoln stands where Roman Lincoln did,

on the northern crest of the ridge, looking across the gap to the southern ridge of Lincoln Edge. The northern gate of the old Roman town is still standing. Close to it are Lincoln Minster and Lincoln Castle, high on the summit of the Edge. The modern city has spread down hill, crossed the river, and is now climbing

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FIG. 22. LINCOLN

The picture shows the town during a horse fair. Notice how high the minster or cathedral stands.

the southern slope of the Edge, on the other side of the gap. The city is full of interest. The castle walls are of enormous extent. The magnificent cathedral, with its three noble towers, rises high above the city.

Lincoln grew rich from the advantages of its position and its share in the wool trade. It remains important because it is the market town of a rich farming country.

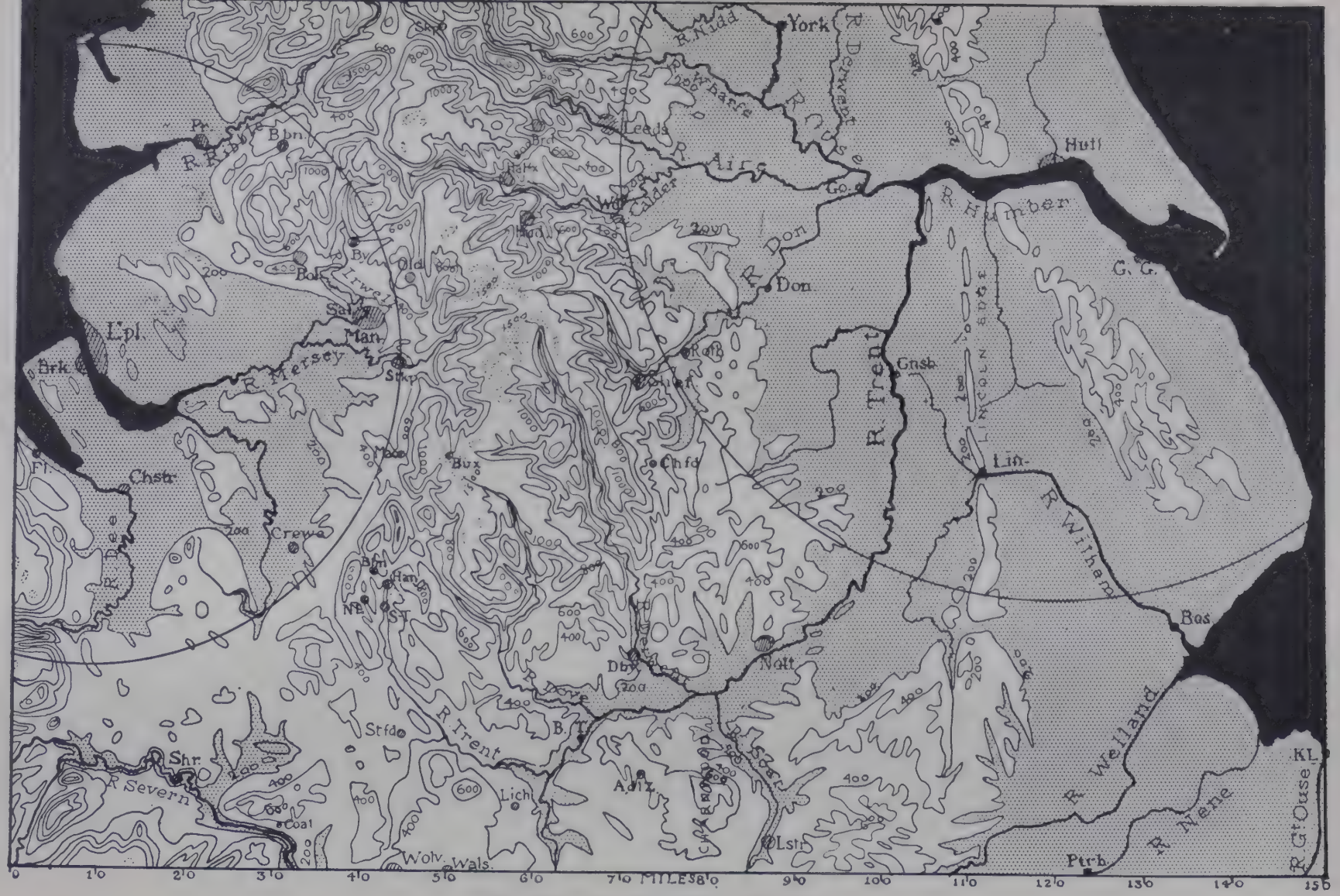

FIG. 23. THE SOUTHERN PENNINES

The contour lines are drawn for every 200 feet; the land under 200 feet is stippled.

Tanneries and glue works show that Lincolnshire is a grazing country. Lincoln has important horse fairs.

139. Three Hundred feet above the Sea. The coloured map shows no land under 300 feet. Lincoln Edge is not shown in it. It is clearly shown on the contoured map in Fig. 23. When land rises gradually to 300 feet it seems quite low. In Lincoln we climb 300 feet in less than a mile. This gives us a very different idea of what 300 feet means. We start from the river, where the Roman canal from the Trent comes in. One long steep main street leads up the face of the hill. The upper part is so steep that a hand-railing is put up. At the end of this long climb we stand between the Castle on the west and the Minster on the east, but we are only 200 feet above the river. (See Fig. 23.) To reach 300 feet we must climb the tower of the ruined castle. If we climb the Cathedral tower we are nearly 500 feet above the river, or 300 feet above Lincoln Edge.

Exercises

1. Colour any part of Fig. 11 or Fig. 20 which refers to this chapter.
2. Describe the scenery and occupations of the Fens.
3. Why are bricks made at Peterborough and boots at Northampton?
4. Draw a map to show clearly the position of Lincoln.

CHAPTER XVI

ACROSS THE BLACK COUNTRY

140. Map Studies. Read § 93. Notice that the lowland belt west of the limestone ranges runs from the Severn estuary to the Humber. The southern part

is drained to the Bristol Channel by the Severn, and the northern part to the Humber by the Trent. (See ch. xix.) It is broken towards the centre by three masses of high ground which separate the Severn and the Warwick Avon from the Trent. Find these on the coloured map. They are the Clent Hills, Cannock Chase, and Charnwood Forest.

141. Coal. Coal is found round all these hills, especially between Clent Hills and Cannock Chase. Rather more than one hundred years ago it was found that steam would drive machinery better than either wind, water, or the human hand or foot. This made the coalfields very important. Coal is heavy and it is cheaper to carry raw material to coal than to send coal to raw material. The new factories were built on the coalfields. In most of the coal districts the coal-miners live in villages near the coal-mines. These mines or 'pits' have wheels and pulleys at the top, to raise and lower the miners and bring up coal and to pump fresh air into the mines. The great heaps of refuse thrown up near them add to the ugliness of a coal-mining landscape.

142. How Coal changed the Size of Towns. Before steam was used there were no railways. Men walked or rode or drove. This took longer and cost more. People did not move about as they do now. They lived where they were born, and often worked at the same trades as their fathers before them.

This changed when steam was introduced into factories. The old towns are far from the coalfields. Before A.D. 1800 most of the people lived in or near them. After A.D. 1800 many people moved to the new manufacturing towns on the coalfields. These are now the most thickly-peopled parts of Britain outside London.

143. Across the Midlands. The Black Country is the name given to the South Staffordshire coalfield between the Clent and Cannock Chase Hills. We can reach it from Oxford in little over an hour. The line follows the Cherwell and crosses the divide to the Warwick Avon, where the great towers of Warwick Castle rise above the river. Here we are almost in the middle of England. The Midlands are a grazing district, with a few busy towns. Coventry is one. It makes bicycles and sewing machines with Warwickshire coal.

144. The Black Country. Soon after leaving Warwick we enter the Black Country. The hedges and trees begin to look dull and grimy. The lines broaden out. We pass strings of coal trucks, full or empty. Rows of mean streets standing in shabby fields are our last sight of the country. The line runs by canals, railway sidings, workshops, furnaces, and factories into a great town.

145. The Black Country Towns. Birmingham is on the edge of the Black Country in a district where iron is found with coal. The iron manufacture began long before coal was used. The ore was smelted with wood from the forests which once covered the Clent Hills and Cannock Chase. Chase is an old word which means forest.

146. Many new processes have been discovered in recent years. All these are used in Birmingham. Huge smelting furnaces turn iron ore into steel in the neighbouring towns. West Bromwich, in the centre of the Black Country, Dudley, Wednesbury, Wolverhampton, and Walsall are all busy places. They form what is really one huge iron town, in which all kinds of steel and iron goods are made.

147. It is easy to see why this district is called the Black Country. Few trees grow there, but there are forests of tall chimneys. The factories and smelting furnaces burn immense quantities of coal, and the air is heavy with smoke. Smuts fall everywhere. By day we hear the clank of machinery, the whistles of 'hooters' and trains, and the din of steam hammers. At night the glare of furnaces lights up the sky.

148. The bright side of the Black Country is the endurance and courage of its men. Some stand stripped to the waist feeding great furnaces and drawing out the molten metal. Miners work all day underground. Explosions often happen in coal-mines. When the dreaded roar is heard men and women are on the spot at once. Not a moment is lost in forming rescue parties. Each man is willing to help at the risk of his own life. In these busy districts men learn to think and act quickly in the hour of danger.

149. The Wealth of the Black Country. Do you want to know what the Black Country manufactures? Make a list of everything that can be made of iron or steel. Do not forget great guns and engines, nor nails and other small things. Such a list would fill many pages. Birmingham makes the most highly finished of these as well as much jewellery and electro-plate.

150. The Black Country is a prosperous district. The value of the coal alone is very great. The manufactured iron and steel goods go all over the world. A network of railways and canals connect it with all parts of the country. Birmingham, like other great industrial cities, has become the capital of its district. Such cities build cathedrals, endow universities, publish their own daily papers, and form the political opinions of densely peopled areas.

EXERCISES

1. What difference has the use of steam made to the size of our towns?
2. Why are the manufacturing towns near the coalfields?
3. Describe the occupations of the South Staffordshire coalfield.
4. By what other name is the South Staffordshire coalfield known? Why?

CHAPTER XVII

THE WELSH BORDER CASTLES

151. Map Studies. Most of Wales is coloured dark brown in the map. The highest mountains are in the west and the longest rivers run east. The valleys of these rivers form natural routes between the western mountains and the plains to the east. The English fought their way up them and settled in their broad lower vales, which became part of England. The Welsh had only the mountains and the upper valleys. Constant fighting went on. The Welsh strove to reconquer the more fertile land and the English were determined to keep it. They built castles where the rivers left the mountains to keep out Welsh invaders. Find Chester, Shrewsbury, Ludlow, Hereford, and Gloucester on the maps in Figs. 11 and 23.

152. The Lancashire-Cheshire Plain. This plain lies between the mountains of Wales and Northern England, in both of which coal is found. The Lancashire portion is a manufacturing district with many large towns. (See ch. xx.) The Cheshire portion is a grazing country, making celebrated cheese. It supplies the Lancashire towns with much farm produce.

153. The maps show how important this opening between the mountains is. This fact explains why Chester was a Roman city, and later a strong Border fortress, and why Crewe and Chester are great railway junctions.

154. Chester. Chester stands on a height in a bend of the Dee, which flows from the mountains of North Wales through lovely scenery. Its old walls and timbered houses are very beautiful. The picture opposite shows how they are built. Chester is one of many old bridge-ports which have lost their sea trade. This is partly because modern ships draw more water, and partly because modern rivers are shallower. The roots of trees bind the soil together. Most of our forests have been cut down. Our rivers wear away the land faster than they did a thousand years ago, when England was forested. Many are too shallow for modern ships. The Dee is one.

155. Chester was built at the head of the Dee estuary, where the road west to Ireland by the North Wales coastal plain, Anglesea, and Holyhead, crossed the road north to Scotland.

156. To hold Ireland the English had to hold the North Wales coastal plain. They fortified it strongly. Chester guarded the entrance, and other castles were built where valleys opened from the south. Conway was one. It guards the mouth of a river-valley opening from Snowdon, the highest part of Wales. The Menai Strait and the strait between Anglesea and Holy Island had to be crossed by boat. An attack there would have been very dangerous, and we find several castles. Bangor and Carnarvon defended the two ends of Menai Strait; Beaumaris defended the landing place on

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FIG. 24. A STREET IN CHESTER

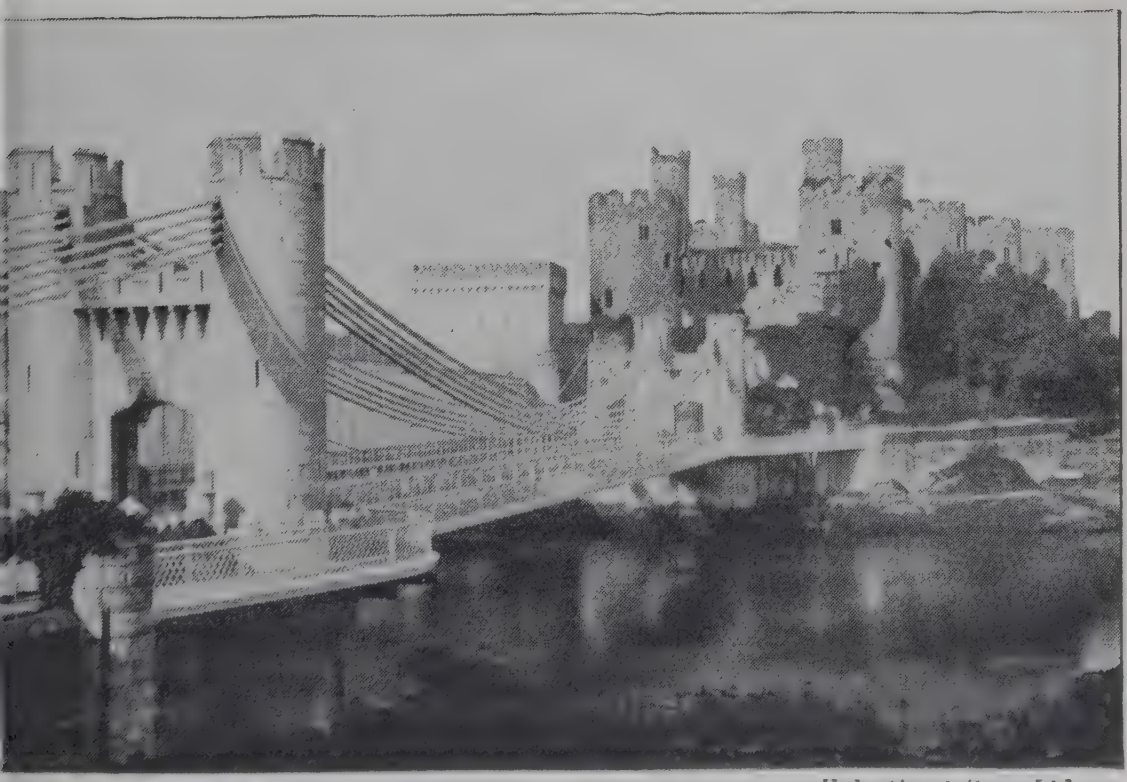

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FIG. 25. CONWAY CASTLE

Anglesea. The North-Western main line to Ireland still follows this route and crosses the straits by a railway bridge.

157. Shrewsbury. Shrewsbury is built on a hill round which the Severn flows. It stands near the northern end of the long narrow valley which leads down to Worcester. It is also quite near the place where the Severn leaves the Welsh mountains.

Shrewsbury is an old town with steep narrow streets and timbered houses. Part of the old city wall still stands. Shrewsbury was a strong Border fortress. The church is one of many abbeys near the Severn.

158. The Severn. Shrewsbury guarded the Severn route into Wales. Trace the river to its source in Plynlymmon, within a few miles of Cardigan Bay. Notice that though its source is very high the river enters the white part of the coloured map after a course of about twenty miles. This shows that its upper course must be wild and steep. Fig. 21 shows that it crosses the 200-feet contour line just above Shrewsbury. It flows past the forested Wrekin and through the Coalbrookdale gorge. Bridgnorth Castle was built near the opening of this gorge to the Severn Vale. Several tributaries flow to the lower Severn. The Stour enters on the left bank from a district of small manufacturing towns on the edge of the Black Country. The Teme enters on the right bank below Worcester, and the Avon, from the orchard country round Evesham, flows in on the left bank at Tewkesbury. The Wye and Usk flow to the estuary.

159. The Teme. The Teme is formed by streams from the Welsh mountains and the beautiful Shropshire hills, which separate it from the Severn. Ludlow

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FIG. 26. LUDLOW CASTLE

The river is the Teme. The view is taken looking up stream to its broad cultivated vale. At Ludlow this valley suddenly narrows between hills, forming a short gorge. Here a bridge was needed and could easily be defended by the castle. The town and castle are built on the heights on the left bank of the river. In the distance on the right of the picture are the Clee Hills, noted for building-stone.

Castle, one of the strongest on the Border, stands on a hill above the river. It made the English masters of the Teme valley between Ludlow and Worcester.

160. Gloucester. The position of Gloucester (see § 103) reminds us of that of Chester. It commands the entrance into the coastal plain of South Wales, which was the southern route to Ireland. This is now followed by the Great Western Railway. (See § 167.)

161. The Wye and Usk. The Wye rises near the Severn. It is one of our loveliest rivers. It leaves the Welsh mountains to enter the plain of Hereford, a land of orchards and meadows, producing cider and cattle. Many castles guarded this rich country. One was built at the cathedral city of Hereford. The maps show how many routes it defended. Lower down the Wye was Monmouth Castle. Below Monmouth the Wye flows through the Forest of Dean, which we saw from the top of the Cotswolds. (See § 101.) Iron has been smelted there for two thousand years, first with forest timber, and later with local coal. The last of the Wye castles was at Chepstow, at the end of the wooded gorge through which the Wye reaches the sea. The Chepstow tides, which are the highest in Britain, run far up the river.

The Usk flows through similar scenery. Newport, at its mouth, now a busy port, defended the Usk route inland. It stands near the site of the Roman Caerleon, which guarded the same route. Here King Arthur is said to have held his court.

162. Mountain and Plain. All these castles, except Chester and Gloucester, are built where the rivers leave the mountains and their valleys become broad and fertile. All, except perhaps Chester and Gloucester, were built to hold the lower valleys of the Welsh rivers.

Exercises

1. Colour those parts of Figs. 11 and 23 which refer to this chapter.
2. Compare the situation of Chester and Gloucester.
3. Describe as fully as you can the Vale of the Wye. Use the map.
4. Compare the climate and occupations of the Cheshire and Hereford plains.

CHAPTER XVIII

WALES

163. Map Studies. The coloured map shows that nearly all Wales is mountainous. Snowdon, the loftiest point of England and Wales, is two-thirds of a mile high. It is a broad high mountain mass, cut into deep valleys by the streams which flow from it. Some of these valleys contain beautiful lakes. Cader Idris, south of Snowdon, and the Brecknock Beacons of South Wales are nearly three-fifths of a mile high. Plynlymmon is much lower.

164. Rugged mountains, wild passes, wooded vales, and lakes make the scenery very beautiful. It is finest in summer when the heather is purple and the gorse and fern are golden.

165. The Interior. Most of the people live round the coast. The interior is a sheep-grazing country. The pasture is poor and a farmer requires a large acreage to graze his sheep. Sheep-grazing regions are never thickly peopled. The life is often very simple. The

farm stands in a valley beside a running stream. The food consists chiefly of eggs, home-cured bacon, chickens, potatoes, and milk. Sometimes trout are caught in the streams, or rabbits are shot on the hills. The farmer's wife looks after the children and animals, bakes, cooks, attends to the dairy, and mends and makes

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FIG. 27. THE SNOWDON GROUP AND THE MENAI STRAIT
Snowdon itself is just out of the picture a little to the right.

many things which we can buy. In odd moments she knits, for time is money in a poor country.

166. Life on the Coast. With the help of the map and what we know of Cornwall and Devon, we can picture the life on the Welsh coast. The coastal plain is narrow, except in three places: in Anglesea, in the Pembroke peninsula, and in the Vale of Gwent in South Wales. Where the coastal plain is narrow the mountains come close to the sea. Short swift rivers

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FIG. 28. A WELSH ESTUARY
Compare this with the estuary shown in Fig. 20.

rush down lovely glens and often form beautiful estuaries shut in by hills. Fishing villages grow up where such valleys open to the sea. Some have grown into large places. Rhyl and Llandudno, on the North Wales coast, are crowded in summer, chiefly by visitors from Lancashire. The largest town on the west coast is Aberystwith, but there are many small ones. Aberystwith means 'at the mouth of the Ystwith', a river from Plynlymmon. Many other *Aber-* towns are found along the coast. The same kind of life is lived on the narrow coastal plains of the south-west.

167. Anglesea and Pembroke. The north and south coastal plains form routes to Ireland. Holyhead on Holy Isle is the northern port for Ireland, by the North-Western route; Fishguard, in Pembroke, is the southern port, by the Great Western route. Pembroke has many fine harbours. The largest is Milford Haven, in which is the Government Dockyard of Pembroke.

168. Anglesea and Pembroke are both on the western edge of Wales and receive heavy rains. Both breed dairy cattle. Anglesea sends milk to the large towns of Lancashire. Pembroke sends milk to the large towns of the Vale of Gwent in South Wales.

169. The South Wales Coalfield. The only large towns of Wales are in the Vale of Gwent, where coal and iron are abundant. There is a small coalfield in the east of the North Wales plain, round Denbigh and Flint, but the coalfields of the Vale of Gwent are much more important.

Short swift rivers from the mountains of South Wales cross this plain to the sea. The towns at their mouths would have remained small fishing ports but for the abundance of coal and iron in their upper valleys. Railway lines run up scorched and blackened

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FIG. 29. AN INDUSTRIAL TOWN IN A WELSH VALLEY
This picture should explain itself.

valleys which were once as lovely as any in Wales. At the head of one such valley among the hills is the iron town of Merthyr Tydvil. Its great blast furnaces smelt both Welsh and foreign ores.

170. Some of the South Wales coal burns without smoke. This smokeless coal is in demand for battleships. Other kinds give out great heat, and are used for smelting. The rocks of the valleys are of limestone, which is used in iron smelting. Two great industries have grown up. One is the smelting of local and foreign ores with the hot smelting coal. The other is a huge export trade in coal from many ports.

171. Swansea. Swansea is built at the western end of the Vale of Gwent. The old castle stands on hills overlooking the bay. The modern town is built up their slopes. Blast furnaces smelt copper from all parts of the world. Iron is smelted too. The tinning of iron is an important industry. West of Swansea the coastal plain disappears and the coast is bordered by high cliffs for many miles. To the east the vale widens. Coal is mined in the north along the mountain edge. Farther south there is room for farmers and fishers as well as for miners. Small ports at the river mouths export coal.

172. Cardiff. Cardiff is the largest coal-exporting port. It is built where the Taff enters the sea, near the eastern end of the Vale of Gwent. Its castle shows that it was a point on the Irish route. Cardiff has smelting furnaces and ironworks, iron shipbuilding yards, and huge docks. These are crowded with ships waiting to load coal for foreign ports. Coal is also exported from the neighbouring ports, including Newport-on-Usk.

Exercises

1. Why do most of the people of North Wales live on the coast?
2. Why is South Wales more thickly peopled than North Wales?
3. What occupations are carried on in the Vale of Gwent? Explain why each is important.

CHAPTER XIX

THE TRENT AND SOUTHERN PENNINES

173. Map Studies. The Pennines separate the eastern and western plains of Northern England. The coloured map shows that they are both broad and high. The Cheviot Hills connect them with the mountains of Southern Scotland. The plains west of the Pennines are narrow, except in the south. The eastern plains are larger. This is well shown in Fig. 23. The larger circle, which shows land within 50 miles of Hull, includes hardly any Pennine land over 400 feet high. The smaller circle, which shows land within 25 miles of Liverpool, includes parts of the Pennines and of the Welsh mountains which are over 1,000 feet high.

Find the Trent in the coloured map and in Fig. 23. It rises where the Southern Pennines sink to the Cheshire Plain. It is a long river with a slow current. Its sluggish right bank tributaries come from the hills of the Black Country and the Midlands. Trace them on the maps. The swifter left bank tributaries flow from the Southern Pennines. Trace these too.

174. The Potteries. Coal is found all round the edge of the Pennines. The Trent crosses one of the Pennine coalfields, the North Staffordshire coalfield. Earthenware is the chief manufacture. At first the coarse clay of the district was used, but now a finer

clay is brought from Cornwall. It costs less to bring the clay to the coal than to send the coal to the clay. Stoke, Burslem, Hanley, and other towns form what is really one great town, where many people work at all branches of the trade. The whole district is called the Potteries.

175. Towns of the Middle Trent. Stafford is on a tributary near the main stream. The map shows that it is on the easiest route from Central England to the Cheshire Plain and the sea. This explains why it was fortified nearly a thousand years ago and is an important railway centre to-day. It obtains coal cheaply and carries on some manufactures. Tanning and boot-making are among them, for it is near the grazing Midland counties. The cathedral town of Lichfield is a few miles south of the Trent.

176. Burton-on-Trent is a brewing town. Very deep wells have been sunk to reach the underground water below the porous limestone. The minerals dissolved in this water give Burton ales their good flavour. Burton buys malt and barley for brewing, and wood for making barrels. Coopering, or the making of casks, has become important. One manufacture often leads to the rise of another.

177. The Peak District. Below Burton the Trent receives the Dove and the Derwent from the high Peak district. Derby, on the Derwent, near the main stream, is on a coalfield. It has long manufactured hosiery, lace, and silk. It is now the head quarters of the Midland Railway. The railway shops employ thousands of men.

The Peak district is the highest part of the Southern Pennines. It is about two-fifths of a mile high. In spite of its name it has no sharp peaks. The hills are capped with limestone or sandstone, which weathers

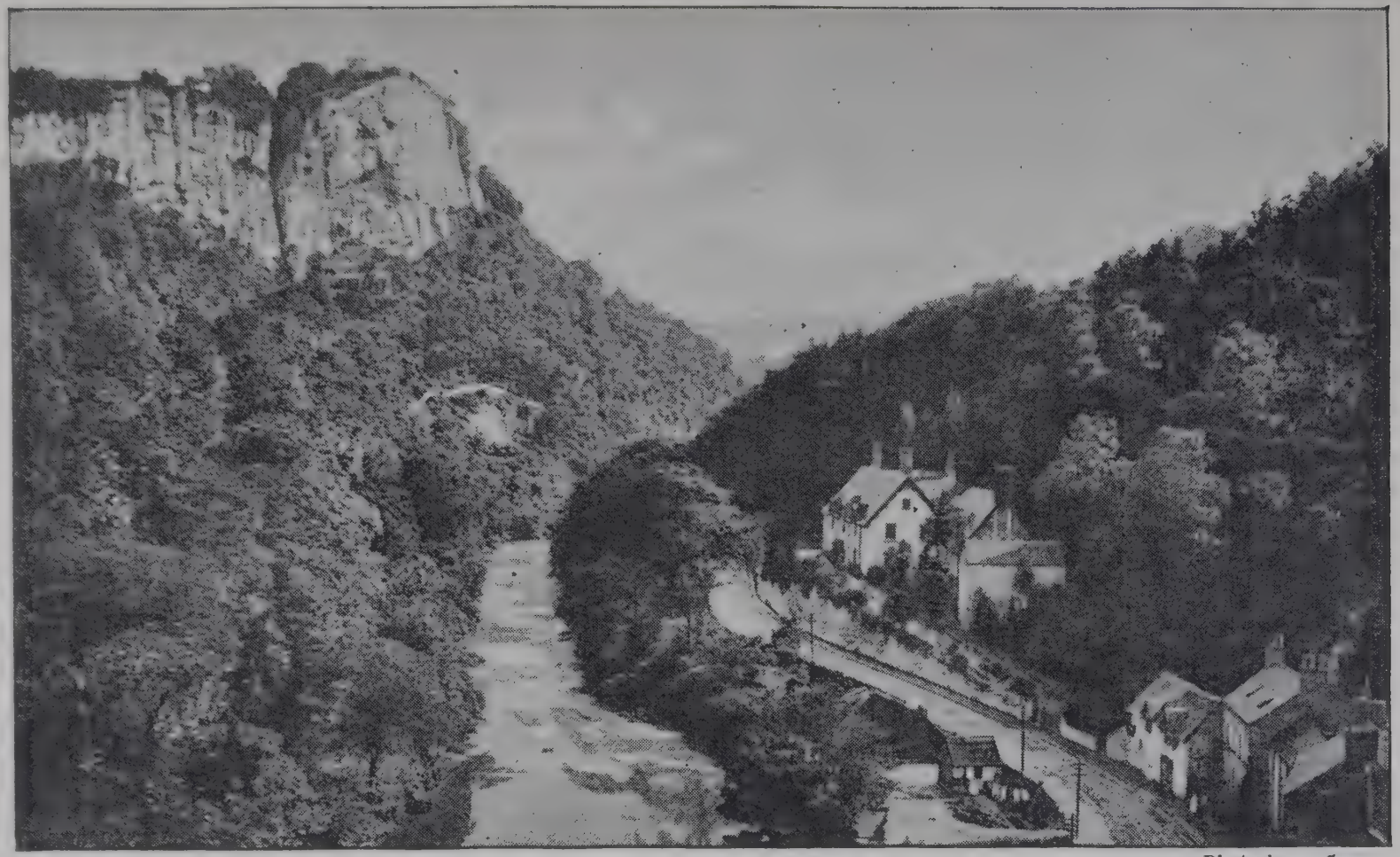

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FIG. 30. A DALE IN THE PEAK DISTRICT

Notice the high bare limestone cliffs and the narrow valley or dale.

into long ridges and 'edges'. The rivers flow in narrow valleys shut in by high walls of rock. North of the Trent such valleys are called dales. Limestone is a rock which is dissolved by water. (See § 98.) In the Peak District the rivers often disappear through cracks which are called swallow-holes and sinks. They flow as underground rivers until they reach the surface again at a lower level. Some of the underground rivers have hollowed out great caverns. In all limestone regions the hills are nearly treeless. Sheep are generally grazed on the short dry turf. Mineral springs are very common. (See § 95.) They occur at Buxton, the highest town in England, and elsewhere.

178. The Soar. The Soar, the most important tributary of the lower Trent, rises in low hills to the south. Leicestershire sheep are grazed on their limestone pastures. The picturesque hilly district of Charnwood Forest (see § 140) lies to the west of the Soar. On the western margin of Charnwood Forest is the coalfield round Ashby-de-la-Zouch, which supplies Leicester and Burton.

179. The Lower Trent Towns. In the lower Trent basin grazing and dairy farming are important. Leicester on the Soar, and Nottingham on a coalfield, make hosiery and lace. Nottingham is built round its castle hill above the Trent. It is on the easiest road round the southern edge of the Pennines into the eastern plains.

180. Below Nottingham the Trent turns north to the Humber, between the Pennines and Lincoln Edge. The country is rolling and wooded. Many of our noble families have country seats near the Trent. This part of England is sometimes called 'The Dukeries'. The remains of Sherwood Forest lie west of the Trent. Many

interesting towns are on or near the river. Gainsborough is an old town at the head of tidal water.

181. The Humber. The Humber is the estuary of the Trent and the Yorkshire Ouse. Goole, the port of the Ouse, is at the head of the estuary, about forty miles from the mouth. The widest part of the Humber is about eight miles across. The largest port is Hull, on the north side. It does a great trade with the North Sea and Baltic ports.

EXERCISES

1. Colour any parts of Figs. 11 and 23 which refer to this chapter.
2. Draw a section of the country along the line joining Leicester and Buxton.
3. Explain clearly the difference between the Potteries and the Black Country. Name the chief manufacture of each. Can you explain why each began?
4. Name some reasons which make the Trent important.
5. Why should boot-making and tanning be important at Stafford?
6. Compare the position of Nottingham and Stafford.

CHAPTER XX

THE COALFIELDS OF THE SOUTHERN PENNINES

182. The Pennine Scenery. North of the Peak, valleys open east to the Yorkshire Ouse and west to the plains along the Irish Sea. The valleys opening east are longer than those opening west. They are also drier and better fitted for farming. The slopes are cultivated as high as possible. The upper valleys are narrow dales leading to a high moorland, above

which rise flat-topped hills. In summer the glowing fern and heather makes us forget how lonely the country is. Twenty miles of moorland lie between the busy Yorkshire and Lancashire towns.

183. The Aire Gap. The maps show that there is one important break in this high broad moorland. It is formed by the valley of the Aire, a tributary of the Ouse. We could follow its valley west through the highest part of the Pennines till we were near the valley of the Ribble without crossing the 400 feet contour line. Both rivers rise farther north and flow south, and both suddenly change their direction where they cross the 400 feet contour line. The Aire turns east to the North Sea and the Ribble turns west to the Irish Sea. The divide between them can be crossed at a height of about 500 feet. The pass is shown on the coloured map by the sign)(.

184. The Aire gap opens a way between the Yorkshire coalfield east of the Pennines and the Lancashire coalfield west of them. A railway and a canal follow the Aire valley to Skipton, and the railway goes on through Settle on the Ribble. The highest point of the line is not over 500 feet.

185. Other lines and even canals now cross the Pennines, but they are carried higher. They were made because of the increasing importance of the Lancashire and Yorkshire manufactures. Lancashire goods intended for eastern markets are sent to Hull and other eastern ports. Yorkshire goods intended for American or African markets are sent west to Liverpool. Each district has thus a double set of ports.

186. Liverpool and the Mersey. The Lancashire coalfield lies between the Mersey and the Ribble. Wigan is the centre of the largest collieries. The

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FIG. 31. SETTLE

Notice the bare flat-topped hills and compare them with Fig. 33. Compare the limestone cliff (×) with Fig. 30.

Mersey is formed by streams which rise in the high moors near Buxton and flow down the western dales. At the base of the Pennines it receives the Irwell, on which is Manchester. Its estuary opens to the Irish Sea. Liverpool and Birkenhead are built on opposite sides of it.

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FIG. 32. LIVERPOOL FROM THE MERSEY

187. Liverpool has many advantages. It is built at the mouth of a fine estuary which opens towards the Atlantic and the New World. Both banks of the estuary are lined with docks for miles. Some of these can take the largest vessels afloat. A huge trade is done with the United States, Canada, and other countries. Enormous quantities of cotton come to Liverpool from the United States to be manufactured in the Lancashire cotton mills. The passenger traffic is also very great. Liverpool has the advantage of obtaining cheap coal from the Lancashire coalfield. This is used in the countless industries connected with the needs of a large population and a great port.

188. Manchester. Manchester, on the Irwell, is

built at the northern end of the Cheshire Plain near the western base of the Pennines, where many roads from the hills and plains meet. Manchester has been important since Roman times. To-day it is the market for all the Lancashire cotton towns. Two million people live within twelve miles of the centre of Manchester. A few years ago the Manchester Ship Canal was opened. Egyptian cotton is brought direct to Manchester, but much American cotton still comes through Liverpool. Most of it is sent to the cotton towns, which return their finished goods to the wholesale warehouses of Manchester. Machinery for cotton manufacture is made in Manchester, Oldham, and other towns.

189. The Cotton Manufacture. Britain does a world-wide trade in cotton goods. These are nearly all made on the Lancashire coalfield. This is due to geographical causes. In the first place it is cheaper to bring cotton to the western ports. The estuary of the Mersey is so placed that raw cotton can be brought to the Lancashire coalfield at the least possible cost. The position of the cotton towns along the edge of the Pennines, where coal is abundant, is the second reason. The Pennine streams bring down abundance of pure water for bleaching and dyeing. The fourth reason is the most important of all. The climate of the west coast suits the manufacture. A fine thread can be spun only in a moisture-laden air. In dry air it snaps. The Lancashire plain is exposed to the wet west winds and protected by the Pennines from the dry east winds. This combination of geographical advantages is not found on any other coalfield in England.[1]

[1] Some cotton is manufactured on the Nottingham-Derby coalfield, in the drier part of England. Here the thread used is much coarser.

The Lancashire cotton towns lie near the mouths of valleys opening from the Pennines. There is fine moorland scenery and air not many miles away. Find Stockport, which nearly joins Manchester, Oldham, Bury, Bolton, Burnley, Blackburn, and Preston. The last is the port of the Ribble estuary.

190. Other Manufactures of the Lancashire Coalfield. One industry leads to others. The cotton manufacture needs special machinery, which is made at Manchester, Bury, Bolton, and Oldham. Chemicals are needed to bleach and dye cotton. Chemical works are found in several towns. A town which makes one kind of machinery is likely to make other kinds. This is the case at Oldham. These and other industries make Lancashire prosperous and densely peopled. The people are among the most skilful artisans in the world.

191. The Manufactures of the Yorkshire Coalfield. The woollen manufacture is as important in Yorkshire as the cotton manufacture in Lancashire. We have seen (§§ 76, 105, 130, 131) that it is one of our oldest industries. Foreign manufacturers from the other side of the North Sea introduced it into towns near the North Sea. (See § 130.) When water and labour became scarcer the woollen manufacturers moved west to the valleys of the sheep-grazing regions, where wool, water, and labour were cheaper. Before coal took the place of water-power the Yorkshire woollen towns at the mouths of the Pennine valleys were small places like Stroud. Much of the weaving was carried on as a cottage industry with handlooms. When steam was introduced the Yorkshire woollen centres quickly grew into large towns, for they stood on the northern part of the largest coalfield in Britain. The wool of the Pennine sheep was no longer sufficient

to feed the mills, and wool is now imported from South America through Liverpool, and from Australia and other countries through London and other eastern ports. Here Yorkshire profits by having a double set of ports (§ 183).

The Aire, and its tributary the Calder, flow through the northern part of the Yorkshire coalfield. Leeds, Bradford, Halifax, Huddersfield, and Wakefield are either on or near it. Leeds manufactures wool and is the market for finished goods. It also makes much of the machinery used in the woollen manufacture.

192. In the southern part of the Yorkshire coalfield, in the Don valley, the steel and iron industry is very important. The chief centre is Sheffield, which stands among high hills and beautiful scenery. The industry is concentrated here because a number of geographical advantages are combined. Iron, coal, and limestone, which is mixed with iron in smelting, are found together. The rocks round Sheffield make excellent grindstones. The Pennine streams supply abundance of water for tempering iron and steel, and water power for turning grindstones if required. These advantages are so great that the making of cutlery was important at Sheffield long before coal was used. The introduction of coal made Sheffield and Rotherham one of the great steel districts of the world. All kinds of steel and iron goods are made in both. Locomotives are made at Doncaster, lower down the Don valley.

193. The Yorkshire coalfield is continued into Nottingham and Derbyshire. (See §§ 177, 179.) Coal-mining is carried on in many villages round Chesterfield in Derbyshire. There are hardly any other industries in the district, and most of the coal is sent to other parts of England, or exported.

EXERCISES

1. Colour Fig. 23, leaving land under 200 feet as it is.
2. Describe the geographical advantages of Liverpool.
3. Write an account of the cotton industry and explain why it is chiefly carried on on the Lancashire coalfield.
4. Why is (*a*) the woollen industry and (*b*) the steel industry important in Yorkshire? Name the chief towns engaged in them.
5. What is meant by saying that the Lancashire and Yorkshire manufacturing towns have a double set of ports?

CHAPTER XXI

THE NORTHERN PENNINES AND THE LAKE DISTRICT

194. Scenery of the Northern Pennines. The Aire Gap separates the Northern and Southern Pennines. We must go north for seventy miles to find such another gap. (See § 204.)

The Ribble rises in the slopes of Whernside, and flows in narrow dales between Ingleborough and Penyghent. The Aire rises a little farther south, not far from Penyghent. These are three flat-topped hills nearly half-a-mile high. The picture of Ingleborough shows what these flat-topped hills are like. Bare limestone covers the moorland in many places. Part of the moor shown in this picture is called the Black Shiver Moss. A 'moss' is boggy ground covered with mosses and other marsh plants. It looks safe till you tread on it. The name Black Shiver Moss speaks for itself. Mosses are common in the Pennines. If the plant covering is solid enough it is cut and dried for peat. Peat burns with a pleasant smell and is still used in the higher Pennine dales.

195. The country round the sources of the Aire and Ribble is limestone. There are many deep crevices and cracks through which streams disappear, or where the roaring of an underground river can be heard. (See §§ 98, 117.) These are locally called pots. The Aire flows as an underground river in part of its course.

196. Shap Fells. Find the Eden on the map. It is sunk between Cross Fell and the mountains of the

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FIG. 33. INGLEBOROUGH

Notice the typical flat-topped hill. Compare it with the higher hills in Fig. 31.

Lake District. Cross Fell, the highest part of the Pennines, is over half a mile high. Fig. 34 shows how close the 400, 600, 800, and 1,000 feet contour lines are on the east of the Eden Valley. This means that the Pennines fall very steeply to it. The contour lines on the west show a more gradual slope.

197. The mountains of the Lake District are connected with the Pennines by Shap Fells, which are much lower than the mountains east and west. They separate the streams which flow south to Morecambe Bay from those which flow north to the Eden and Solway Firth. The North-Western main line to Scotland follows the

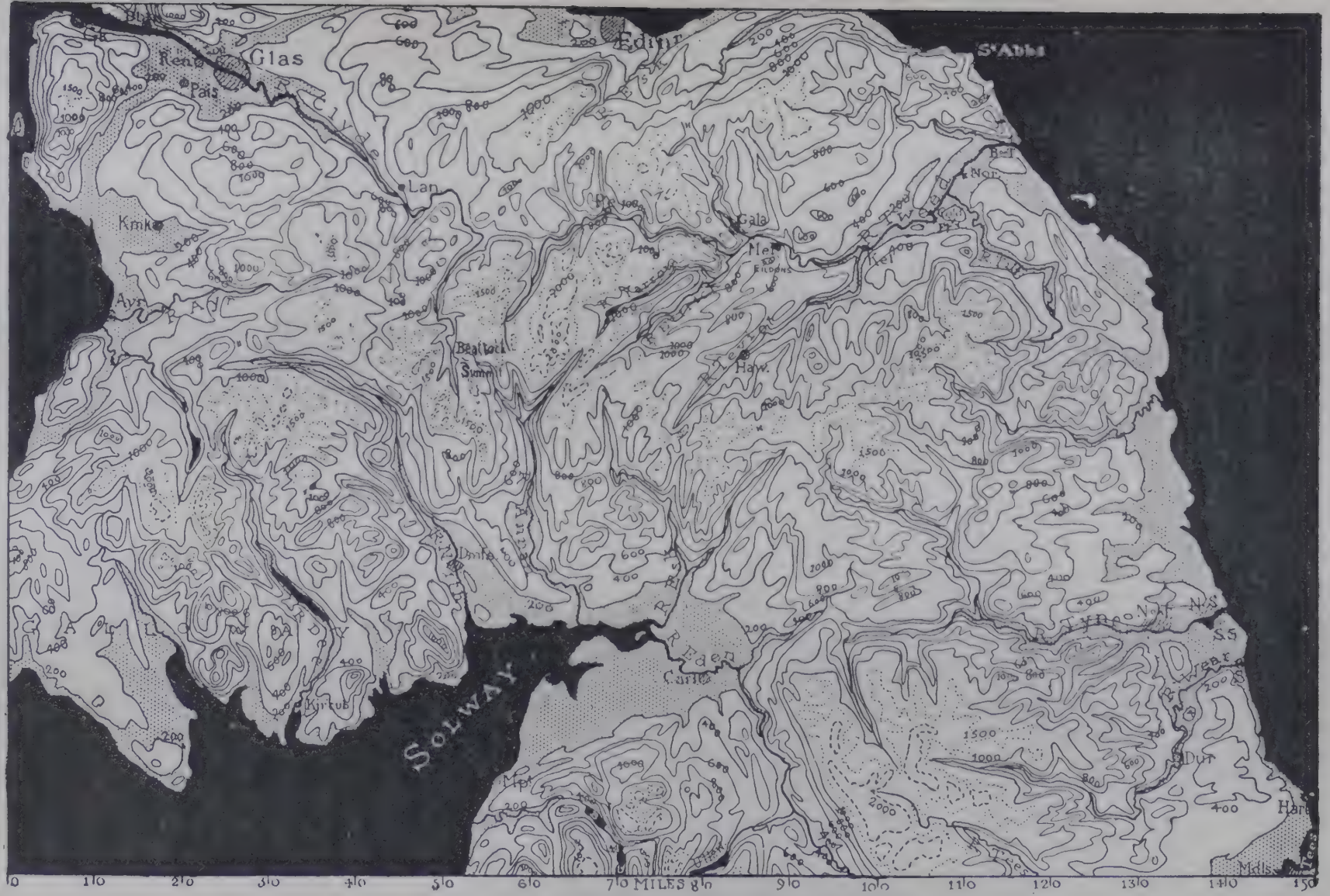

FIG. 34. THE ENGLISH AND SCOTTISH BORDERS

The contour lines are drawn for every 200 feet up to 1,000 feet, and for every 500 feet above 1,000 feet.

Lune valley from Lancaster, crosses Shap Fells at a height of about 900 feet, and follows the Eden to Carlisle. The pass is marked in the coloured map by the usual sign)(. The Midland line to Carlisle is farther east. It climbs nearly 300 feet higher.

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FIG. 35. HELVELLYN

Notice the small steep valley cut by a stream on the flank of the hill. In the foreground notice the broad stretches of pebbles on either side of the stream. This shows how much wider it is after heavy rains.

198. The Lake District. The Lake District is partly drained to the Eden Valley. It is one of the most beautiful parts of England. The lakes lie in narrow valleys shut in by high mountains. High passes separate these valleys. The streams rise high, and their upper courses are very steep. Many form beautiful waterfalls.

199. Find the larger lakes in the coloured map or in a good atlas. The cliffs of Helvellyn rise above the wooded shores of Ullswater. Fig. 36 shows Striding

Edge near the top of Helvellyn. It falls steeply on both sides. Such ridges become much broken by weathering. If a loose stone is dislodged it rattles down hundreds of feet to one of the valleys below.

200. Skiddaw and Saddleback fall to Lakes Derwentwater and Bassenthwaite. These were once a single lake. The low ground between them is the delta of a stream which entered this lake. High mountains separate these lakes from small lakes farther west.

201. From the southern end of Derwentwater we might cross high passes to the southern lakes, Coniston, Wastwater, and Windermere. Coniston and Windermere are beautifully wooded. Wastwater has grander scenery. The dangerous precipices of the Screes fall steeply to it, and Scafell and Great Gable are near.

202. The Furness Region. South of Coniston and Windermere is the Furness district, where fine iron ores are found. These are smelted at Barrow with coal brought across the Pennines from the Newcastle coalfield. Barrow has grown in half a century from a fishing village into a great iron and steel town, which makes modern guns and armour-plated ships.

203. Carlisle. The map shows how important the position of Carlisle is. It is built where the Eden leaves the mountains and enters the Solway. All the western routes between England and Scotland pass by Carlisle. It is also near the western end of the Tyne Gap. Carlisle has seen much hard fighting. The castle, cathedral, barracks, market-place, and gaol show that it is the centre of the surrounding country in many different ways.

204. The Tyne Gap. The Tyne Gap is formed in the same way as the Aire Gap. The South Tyne rises near Cross Fell and flows north. Where it crosses the

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FIG. 36. VIEW FROM THE TOP OF HELVELLYN

Notice the ridge of Striding Edge on the right and how steeply it falls. In the distance is Lake Ullswater.

400 feet line it turns sharply east between the Pennines and the Cheviot Hills. From this turning-point it is easy to reach the valley of a stream flowing west to the Eden without crossing the 500 feet line.

205. The Roman Wall. The Romans fortified the route by the Tyne Gap. They built a wall from sea to sea to keep out invaders from the north. The northern wall was of stone with a deep ditch beyond. South of this there was a second wall of turf. The road ran between the two and was defended by camps and watchtowers. Newcastle-on-Tyne and Carlisle guard the ends of this route, along which a railway runs.

Exercises

1. Colour the part of Fig. 34 which refers to this chapter.
2. Point out any resemblances between the limestone Cotswolds and the limestone Pennines.
3. How was Lake Derwentwater separated from Lake Bassenthwaite? Describe as fully as you can what happened. (If possible, refer to Vol. I, § 35).
4. What do you know of the Aire and Tyne Gaps?
5. How far does Carlisle owe its importance to its geographical position?

CHAPTER XXII

PLAINS AND COALFIELDS ROUND THE NORTHERN PENNINES

206. Map Studies. The Vale of York, east of the Pennines, opens to the eastern and central plains of England. The Ouse flows through it to the Humber estuary. The Ouse is a Pennine river. The Derwent is the only important tributary from the east. Find it on the map. It flows through the wide

Vale of Pickering which opens between the Yorkshire Moors and the Yorkshire Wolds to the sea. The seaward end of the Yorkshire Wolds forms the white cliffs of Flamborough Head. North of this no chalk is found.

207. Find the Pennine tributaries of the Ouse. The Don, Calder, and Aire come from the Southern Pen-

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FIG. 37. A DALE IN THE NORTHERN PENNINES
The cultivated lower slopes of the valley and the uniform height of the Pennines is well shown.

nines. The busiest industrial towns of Yorkshire are in or near these valleys. (See §§ 191–3.) The Swale, Ure, Nith, and Wharfe come from the Northern Pennines through beautiful dales. Each has a town where it leaves the hill country.

208. The Vale of York. The Vale of York contains some of the most fertile land in England. The Pennines keep off the wet winds and make the climate dry enough for wheat. There is much good grazing land

too. The Vale has long been rich. We see this from the number of abbeys and cathedrals. Ripon Cathedral, on the Ure, and most of the towns and abbeys lie between the Ouse and the Pennines. This suggests that the early prosperity of the Vale was due to the valuable Pennine wool.

209. York. York is built where many roads cross

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FIG. 38. YORK MINSTER
The river Ouse is shown in the foreground.

the tidal waters of the Ouse. In Roman times it was the northern capital of England. It is still so in Church matters. The Archbishop of York is independent of the Archbishop of Canterbury within the northern province.

210. York is a busy place, carrying on several manufactures. In spite of this it looks almost as venerable as Chester. The old walls still encircle much of the city. A walk round them shows the beauty of

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FIG. 39. WHITBY

This picture shows the narrow estuary and the North Sea beyond. The fishing village is built near the mouth of the estuary, where boats could find a sheltered harbour. It climbs the steep banks on both sides. On the cliffs to the right is Whitby Abbey. Shipbuilding was formerly important, and Whitby built the ships in which Captain Cook sailed round the world.

the great Minster. The narrow streets are full of fine old houses. One street is called Stonegate, which means Stone Street. Gate is a Scandinavian word for street. Street comes from the word the Romans used. The streets of Lincoln are also called 'gates'. The Danish pirates who fought their way up so many of our rivers brought the name into England.

211. The Yorkshire Coast. A narrow coastal plain borders the North Sea. It is crossed by short rivers with fishing ports at their mouths. The largest is Scarborough, which has become a very fashionable place. Whitby shows what such fishing ports are like. The narrow estuary opening between the hills makes a sheltered harbour. The fishing village is built along the river and the visitors' town has spread up the cliffs. These are crowned by a ruined abbey. (Fig. 39.)

212. The *-by* in Whitby shows that the Danes found out the river and settled at its mouth.[1] (See § 47.) If we followed it inland, it would lead us up between wooded hills on to the moorland, where Danby Beacon blazes with heather in summer. Danby, of course, is Dane-by. The beacon hill may have signalled the news of the first Danish landing at Whitby. It must often have been lighted when a Scottish invasion was threatened.

213. The Coalfields of the Northern Pennines. Coal is found along both edges of the Pennines. The coalfields of the Eastern Pennines are the more important. The Cumberland coalfield lies round Maryport, west of the Lake District. It is well placed for exporting coal by sea. It sends much to Ireland.

[1] We saw the same ending in Grimsby and Derby. Fell, the name given to high moorlands in Northern England (see §§ 195–6), is also a Scandinavian name.

214. The Northumberland-Durham Coalfield. Middlesbrough-on-Tees, at the foot of the Cleveland Hills, may be compared with Barrow-in-Furness. (See § 201.) The Cleveland Hills supply fine iron, which is smelted at Middlesbrough and used in the same

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FIG. 40. TEESDALE FORCE

Force is a Scandinavian name for a waterfall. The view is taken in the beautiful upper dale of the Tees.

industries as at Barrow. Both towns were fishing villages sixty years ago.

215. The coast from the Tees to the Tyne is very busy. If we think of the way in which the world is carried on, we shall understand what kinds of things are made. We build huge armour-plated battle-ships fitted with guns which can send heavy shells for many miles.

We put up great steel bridges across arms of the sea and drive their foundations of steel into the bed of the sea. We tunnel through mountains and drive heavy trains through them. We even tunnel below the sea itself. Most of what is needed for such work is made between the estuaries of the Tyne and the Tees, but chiefly on the Tyne. Find Hartlepool, the Tees port; Sunderland, the Wear port; and North and South Shields and Newcastle, the Tyne ports. All these ports have great shipbuilding yards, and export much coal.

216. These busy rivers, the Tees, Wear, and South Tyne, rise near each other in the highest part of the Pennines among grand scenery. Trace their courses.

217. Durham on the Wear reminds us of Lincoln. It is built where the river flows through a gap in the low hills between the Pennines and the sea. Its cathedral stands finely on the hill above the river.

218. Newcastle. Newcastle, as the name shows, was first a fortress. It guarded the route west through the Tyne Gap, and the way north into Scotland by the coastal plain. This narrow plain is crossed by short rivers from the Cheviot Hills. Small towns are built where the rivers reach the plain and where they enter the sea. This plain widens to the plain of lower Tweed. Berwick-on-Tweed is the most northern town in England.

EXERCISES

1. Colour the parts of Fig. 21 which refer to this chapter.
2. Describe the Vale of York.
3. Why is shipbuilding important on the Tees and Tyne?
4. Which is the easiest way into Scotland, the route by Carlisle or the route by Newcastle? Give your reason.
5. What difference does the position of the Pennines, far to the west, make (*a*) to the size of coastal plains, (*b*) to the length of the rivers, (*c*) to the number of inhabitants? Give your reasons.

CHAPTER XXIII

THE CHEVIOTS AND THE TWEED

219. Map Studies. The land between the Tyne and the Firths of Forth and Clyde is coloured dark brown. This hilly region consists partly of the Cheviots and partly of the Southern Uplands. The Cheviots must be crossed to reach the Tweed from Carlisle, and the Southern Uplands to reach the Forth from the Tweed. To reach the Clyde from Carlisle only the Southern Uplands need be crossed. Trace the Tweed and Clyde to their sources in Fig. 34. The contour lines are drawn for every 200 feet up to 1,000 feet and after that for every 500 feet.

220. The Scottish Border. The Border between England and Scotland is formed partly by the Tweed, partly by the Cheviots, and partly by streams flowing to the Solway Esk. It reminds us of the Welsh border. Both Wales and Scotland are difficult to enter except along the coastal plains. Carlisle and Berwick are the keys of Scotland, just as Chester and Gloucester are the keys of Wales. The routes across the Border hills by the river valleys are long and difficult. The Scots, like the Welsh, were always trying to push from their poor hills down the river valleys, while the English pushed up the river valleys and settled them where they could. The Tweed rises in the heart of the Southern Uplands, but the English held part of its fertile lower vale, just as they held the lower vale of the Severn which rises in the heart of Wales. In both countries they built castles where the rivers left the hills to keep out invaders and to secure their hold on the lower valleys. (See ch. xvii.)

221. Sometimes there was open war between Scotland

and England. At other times raids were made by the great Border lords. The old ballad of Chevy Chase (Cheviot Forest) tells of a border fight between the English Percies and the Scottish Douglas. When the Scots won they drove the English cattle over the border and burned the farms. When the English won the Scots suffered in the same way.

222. Across the Cheviots. The North British line from Carlisle to Edinburgh crosses both the Cheviots and the Southern Uplands. It first follows the Esk, and then turns up the valley of a tributary which forms part of the Border. Steep bare hills rise on both sides. Hardly a house is seen between the stations. On a large map of the country every hill and valley is marked and the names are worth notice. The streams are called burns or waters. The place where a river rises is its head. The place where it enters another river is its foot. Hills are braes, or fells, or riggs, or laws, or knowes, according to their height and shape. Men look very closely at the scenery of a hill country where roads are few. In winter, when the snow lies deep on the Southern Uplands, a good eye for country may save the life of shepherd and sheep. Such names as Ewe Knowe, Wetherhorn Hill, Lamblair Knowe, show that we are in a sheep-grazing country. Cheviot sheep and Cheviot wool are famous.

223. So long as the line climbs towards the divide, the river and the train run in opposite directions. At last the train goes through a tunnel below the divide between the Esk and the Tweed. At the other end stream and train follow the same direction. The train is running down hill, following valleys which lead to the Teviot, a tributary of the Tweed. On the hills above there is a great camp like that on Salisbury Plain. Such

camps can only be made in a country which has very few inhabitants. At last we reach the Teviot and the woollen town of Hawick.

224. Hawick. Hawick reminds us of Stroud. It is built in such another narrow valley between high hills on which sheep graze. The mills are along the river and the town climbs the slopes. Hawick makes 'cheviots' and 'tweeds'.

225. The line now crosses from valley to valley to shorten the distance to the Tweed. It passes conical hills which look like old volcanoes. This is what they are. At last the three volcanic cones of the Eildon Hills come into sight. The line has reached the Tweed at Melrose.

226. Melrose. Melrose is built on the Tweed at the foot of the Eildons. The valley is still narrow and shut in by hills. These are cultivated as high as possible, chiefly with oats. Melrose Abbey, now in ruins, is one of many abbeys built by a Scottish king. He acted more wisely than he knew. The church lands were well farmed, and the monks did much to make the lower Tweed valley prosperous. The population became too large for the English to settle in it, although they might pillage the country and destroy the abbeys.

227. A view from the Eildon Hills. The view from the Eildon Hills makes the geography of this part of Scotland very clear. To the north and north-west are the Ettrick, Yarrow, and Gala valleys opening to the Tweed. The edge of the Southern Uplands rises beyond. To the east the country opens to the broadening vale of Tweed. To the south is the long line of the Cheviots, flat in Carter Fell and more pointed in Cheviot. In the south-west, Teviotdale opens between the Cheviots and the Southern Uplands.

228. The Tweed. Find the source of the Tweed. The rhyme says that

> Annan, Tweed, and Clyde
> Rise on one hill-side.

The Tweed falls 1,000 feet in its first thirty miles. It flows between high hills to Peebles, another woollen town. There it is already a noble river. Below Peebles it descends more gently through a wooded valley with treeless hills above. These hills are cut up by the picturesque valleys through which the Ettrick and other tributaries flow. A mile or two above Melrose the Tweed flows past Abbotsford, the home of Sir Walter Scott, who made this district famous. Almost opposite is the mouth of the narrow Gala valley, which leads north. A few miles below Melrose the Tweed flows past the abbey where Scott is buried. Its valley then widens. Kelso Abbey is built where the Teviot joins the Tweed. Kelso is a busy market town with famous sheep fairs.

Below Kelso the Tweed forms the boundary. The line to Berwick keeps on the English side. It passes Coldstream where many armies have waded the ford. Flodden Field is a mile or two away on a stream flowing from the Cheviots. Norham Castle, celebrated in Scott's *Marmion*, stands high above the Tweed. Seven miles lower is Berwick.

Exercises

1. Colour the part of Fig. 34 which refers to this chapter.
2. Draw a section of the country along the line joining Carlisle and Edinburgh.
3. Compare the Welsh and Scottish Borders.
4. Read the ballad of Chevy Chase.
5. Why is wool manufactured at Hawick?

F. Walker, Galashiels.

FIG. 41. THE TWEED VALLEY AND THE CHEVIOTS, SEEN FROM GALASHIELS

This view shows the valley of Gala Water opening south to the Tweed. Notice the woollen town of Galashiels built in the valley, with many mill chimneys. The hills marked with a white cross are the edge of the Southern Uplands. The line of the Tweed valley running from right to left beyond them is very clear. Melrose lies below the + at the foot of the volcanic Eildon Hills (×). In the distance is the line of the Cheviot Hills (+). Compare this picture carefully with the maps.

CHAPTER XXIV

FROM THE TWEED TO EDINBURGH

229. Map Studies. Fig. 34 shows the direction of the river valleys between Melrose and Edinburgh. The Gala valley leads almost due north through the Southern Uplands for nearly twenty miles before it turns west.

230. Across the Southern Uplands. Above Melrose the line crosses the Tweed to the narrow Gala valley. The woollen town of Galashiels is built between high hills near the mouth. Its situation and geographical advantages are the same as those of Stroud. From the hills above the town the southern edge of the Southern Uplands, the valleys of Gala and Tweed, the Eildon Hills, and the distant Cheviots are seen. (Fig. 41.)

231. The scenery of the Southern Uplands is very like that of the Cheviots. There are fir copses along the Gala, but the higher hills are bare. They are used for sheep-farming. The country is thinly peopled and there are few houses. The highest point of the line is about as high as Shap Summit (900 feet). A moor stretches between the Lammermuir Hills to the east and the Moorfoot Hills to the west and forms part of the divide between the Tweed and the Forth estuary. The train leaves the Gala here and descends to the Esk. Collieries and strings of coal trucks show that a coalfield is near. The hills become lower and open out to the sea. The long range of the Pentland Hills, the lion-shaped Arthur's Seat, and the great rock of Edinburgh Castle come into sight.

232. Edinburgh. Edinburgh grew up round the Castle Rock, which rises more than 400 feet above

the sea. High precipices fall steeply down on every side but the east. This made it a natural stronghold such as early men chose for their homes.

233. A high ridge slopes east from the castle to Holyrood Abbey and Palace at the foot of Arthur's Seat. The old city did not extend farther. A large

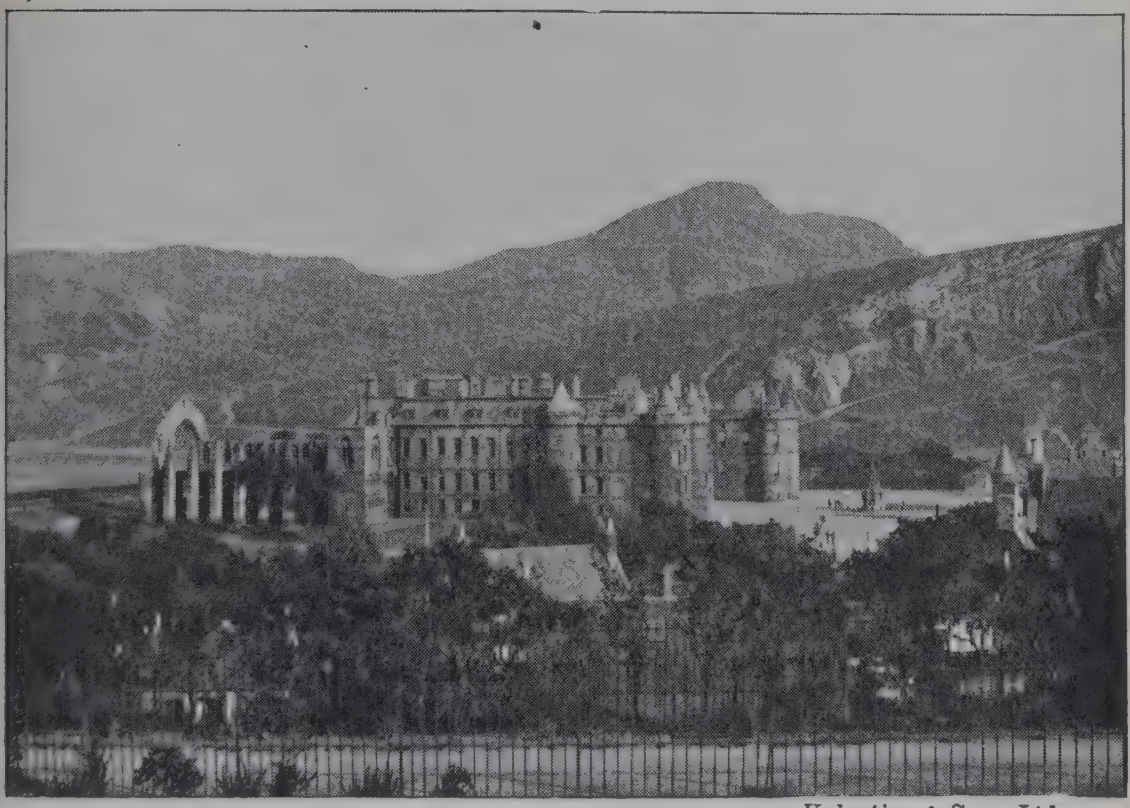

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FIG. 42. ARTHUR'S SEAT AND HOLYROOD

population had to live in a small space. The houses of the Old Town were built many stories high. Each floor or flat made a separate house. The alleys or closes between them were so narrow that a man could stride across them. These high old houses still stand on the top of the ridge, looking down on the New Town to the north. The cathedral, the old Parliament House, and the Law Courts are all in the Old Town. Long flights of steps or steep streets lead down to Princes Street

and the New Town. Princes Street has finer views than any street in Europe.

234. The View from Edinburgh Castle. As we came north we saw many old volcanoes. Edinburgh Castle Rock is the remnant of another. When the volcano ceased to be active the lava which filled its pipe or vent cooled and hardened. As ages passed, the ash cone and the rocks below were gradually worn away. Only the hard plug of lava which forms the Castle Rock was left.

235. The view from the Castle Rock shows us much of Scotland. To the north is the Firth of Forth, dotted with islands. Beyond is Fife, with ports along the wooded coast and ranges of hills inland. The Forth Bridge, more than a mile long, joins the two shores. To the north-east are more hills, with much higher peaks rising behind them. These are the Highland peaks round Loch Lomond. To the south the country is more open and wooded. The Pentland hills rise quite near and beyond are the Lammermuir and Moorfoot Hills.

236. This view includes parts of three different regions. The Lammermuirs and Moorfoots belong to the Southern Uplands. Edinburgh itself is in the Central Lowlands, a region of plains and scattered hill ranges. Some of these we see in the Pentlands and the hills of Fife. Still farther north is the Highland region. We catch a glimpse of it in the distant peaks round Loch Lomond.

237. The Industries of the Edinburgh District. Edinburgh is the capital of Scotland. The cathedral, the Old Parliament House, the Record Office, the Supreme Law Courts, the head offices of banks, insurance, and railway companies are there. Manufactures are carried on with Midlothian coal. Brewing and

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FIGS. 43, 44. EDINBURGH

Fig. 43 shows the Castle Rock falling steeply to the valley, and the western half of Princes Street. Near the middle of this street a road crosses the valley and climbs the ridge to the Old Town. This road is better seen in Fig. 44, which shows the eastern part of Princes Street with Calton Hill and the sea beyond. In the middle of the street is a fine monument to Sir Walter Scott (×).

paper-making depend on the excellence of the water. Paper mills are built in the narrow valleys of many streams round Edinburgh. Leith, the port of Edinburgh, is reached by steep streets leading down from the New Town. Coal is one of its exports.

238. The Edinburgh District. The surrounding country is beautiful in scenery and full of historic interest. Day trips can be made to the nearer parts of the Highlands. Steamers cross several times a day to the Fife towns. The southern coast of the Forth is also dotted with towns. North Berwick and Dunbar are crowded in summer by golfers.

Dunbar has seen much fighting. It guards the northern end of a defile through the Lammermuirs, which form the wild coast round St. Abb's head. The East Coast railway passes through this defile.

EXERCISES

1. Colour the part of Fig. 34 which refers to this chapter.
2. Describe the scenery and occupations of the Southern Uplands.
3. What difficulties had to be overcome in making a railway from Berwick to Edinburgh ?
4. Why is Edinburgh well placed to become the capital of Scotland ? (Use the maps.)

CHAPTER XXV

SOUTH-WEST SCOTLAND

239. Map Studies. Many rivers flow from the Southern Uplands to Solway Firth in valleys nearly parallel to the Esk valley. Find the Annan, the Nith with Dumfries, and the Dee with Kirkcudbright. The contour lines in Fig. 15 show how steep the sides of their valleys are. The mountains of the Lake District,

the Isle of Man, and Ireland can be seen from the higher hills round their lower valleys.

240. Dumfries. Dumfries resembles Carlisle in situation. Both are built where rivers leave the mountains to enter Solway Plain. Dumfries commands two important routes. One goes by the Nith valley to the Ayr lowland and Glasgow. The other runs through Galloway to Stranraer. Trace these routes on the map.

Dumfries is the market town of a large sheep-farming district. Its wool fairs are very important. Some cloth is manufactured. The lower valley of the Nith is well wooded and fertile, with many ruined castles and abbeys.

241. Galloway. Galloway lies north of the Solway Firth and west of the Nith valley. In the north it is a sheep-farming region of moors and mountains. The moors are covered with heather, from which bees make famous Galloway honey. The lower valleys of the rivers open to the sea across small lowlands. These receive rains from the Atlantic winds, and supply good pasture for horses and black Galloway cattle. The salmon fisheries are important in the Galloway rivers.

The Galloway ports are small. They open from one thinly peopled region towards another. Stranraer, in the west, at the head of Loch Ryan, is a port for the north of Ireland. Loch is the same word as lake. In Scotland it is often used of arms of the sea.

242. Across the Southern Uplands to Glasgow. The Caledonian Railway to Glasgow follows the Annan Valley. It skirts the edge of the Southern Uplands, and then follows the valley into their heart. As the valley narrows the bare rounded hills grow higher, and the scenery becomes wilder and more desolate. The line leaves the main stream for the valley of a tributary to reach Beattock Pass. The top of the pass is 1,000 feet

above the sea. The Clyde, Tweed, and Annan rise in the hills around. The contour lines in Fig. 34 show that this is one of the highest parts of the Southern Uplands. The line begins to descend Clydesdale, the valley of the Clyde. From the top of some of the hills overlooking Clydesdale the seas on both sides of Scotland can be seen on a clear day. In the west the distant peaks of Arran rise out of the Firth of Clyde. In the east is the Firth of Forth with its many islands. Scotland is very narrow here, and the hills are nearly half a mile high. Fig. 34 shows that the upper part of Clydesdale is narrow and steep, but that the middle and lower parts are much wider and less steep than the valleys of the rivers flowing to the Solway.

243. The Lanarkshire Coalfield. After passing the junction for Edinburgh, collieries and coal trucks show that the line is entering the Lanarkshire coalfield. The Clyde makes fine falls near Lanark, but this town lies off the main line.

Before coal was used this part of Scotland was beautiful but thinly peopled. Now it is prosperous, but disfigured by the collieries, furnaces, and chimneys of a coal and iron district. Nearly all the smelting furnaces of Scotland are within twenty miles of Glasgow.

244. Glasgow. Glasgow is the bridge-town of the Clyde, where roads from the Southern Uplands and the Highlands cross the river. The university is five hundred years old, and the cathedral is older. Glasgow has grown enormously in the last hundred years through the importance of its iron and steel industries. Its position is very good. It stands on a rich coal and iron field, on the edge of the only thickly-peopled region of Scotland. It is at the head of a great estuary which leads from the Atlantic into the heart of the country.

Scotland is so narrow here that Glasgow is within easy reach of the North Sea ports. Immense sums have been spent in deepening the Clyde, the upper part of which had become silted up. The Clyde is now one of the busiest seaways in the world. Many kinds of raw material are brought in to be manufactured with Lanarkshire coal.

245. Industries of the Glasgow District. The Clyde is a great shipbuilding river. This is what we should expect where a rich coalfield opens to a fine estuary. Every kind of machine, boiler, engine, bridge, girder, and engineering appliance is made in or near Glasgow. A ring of busy iron towns surrounds it. These are constantly growing. When land becomes too dear in Glasgow or the other towns, some firm moves its works outside. This leads to the growth of new suburbs and new towns. In this way the manufacturing districts gradually become one great town.

246. Other industries are carried on round Glasgow. Some depend on the American trade. Cotton is made into sewing cotton at Paisley, which has the damp climate needed for spinning. Sugar is refined at Greenock, at the mouth of the estuary. Wool is manufactured in Kilmarnock. Dumbarton, on the north side of the estuary, at the mouth of a stream which flows from Loch Lomond, uses its pure water for dyeing and bleaching. (See § 189.)

247. The Firth of Clyde. Below Greenock the scenery of the Clyde is very fine. On the north many beautiful sea lochs open into the Highlands.

248. The islands of Bute and Arran lie in the Firth of Clyde. Bute is close to the mainland. Rothesay, on the north, has a fine view of loch and mountain. Many excursion steamers sail from here in summer. Arran

FIG. 45. THE CENTRAL LOWLANDS OF SCOTLAND

FIG. 46. THE CENTRAL LOWLANDS OF SCOTLAND—MUCH SIMPLIFIED
The land above 600 feet is stippled.

lies in the open sea, with the long Mull of Cantyre protecting it from the Atlantic. Its highest peak, Goatfell, is higher than any part of the Southern Uplands. The view from the top is very fine. To the north-west we see many of the great Highland peaks. To the south-east are the Southern Uplands, and the Irish mountains can be seen far away in the south-west.

249. Ayrshire. The plain of Ayr opens to the Firth of Clyde and the Atlantic. It has a moist mild climate and makes good grazing land. Its dairies supply the Glasgow district with milk, butter, and cheese. The pigs fattened on the skim milk are cured into Ayrshire bacon. The coast is dotted with fishing villages and small ports. Ayr and other ports export coal to Ireland.

Exercises

1. Colour the uncoloured parts of Fig. 34.
2. Draw a section of the country along the line joining Glasgow and Ayr.
3. Why is Carlisle more important than Dumfries?
4. What industries are carried on in or near Glasgow? Say why each has become important.

CHAPTER XXVI

THE CENTRAL LOWLANDS OF SCOTLAND

250. Map Studies. Edinburgh and Glasgow are both in the Central Lowlands. These stretch from sea to sea between the Southern Uplands and the Highlands. The estuaries of the Forth and Clyde pierce deeply into them on the east and west. The heads of these estuaries are only thirty miles apart. Communication between sea and sea is quick and easy.

251. Compare the maps in Figs. 45, 46 with the coloured map. The Central Lowlands are broken up by ranges and isolated hills. Several of these are volcanic. The Renfrew Heights, the Campsie Hills, the Ochil Hills, and the Sidlaw Hills form a well-marked line of high ground running from south-west to north-east. This is also the direction of many of the heights of Great Britain. (See §§ 93, 132.) These heights divide the lowlands into two regions. The region south of them is chiefly engaged in manufactures, though farming is important too. All the coalfields are in this part of the Lowlands. The northern region, between them and the Highlands, is chiefly agricultural. Find the fertile vales of Strathmore (Great Vale) and the Carse of Gowrie, north and south of the Sidlaws.

252. The Highland Margin. The Central Lowlands are shut in on the north by the Scottish Highlands. These also run from south-west to north-east. A line from the mouth of the Clyde to Stonehaven on the east coast lies nearly along their southern edge. This line crosses Loch Lomond, the largest lake in Great Britain. Loch Lomond lies only 20 feet above the sea. A sail up it shows how suddenly and steeply the Highlands rise. At the lower end the shores are low and wooded. The northern end is shut in by mountains which rise nearly three-fifths of a mile above its waters. This is shown by the contour lines in Fig. 45. Those round the narrow upper end are very close, especially along the eastern shore. The same abrupt rise is seen in the east, where the Highlands rise above Strathmore as a steep escarpment.

253. Rivers of the Central Lowlands. The lower courses of the Clyde from the Southern Uplands and of the Forth and Tay from the Highlands are in the Central

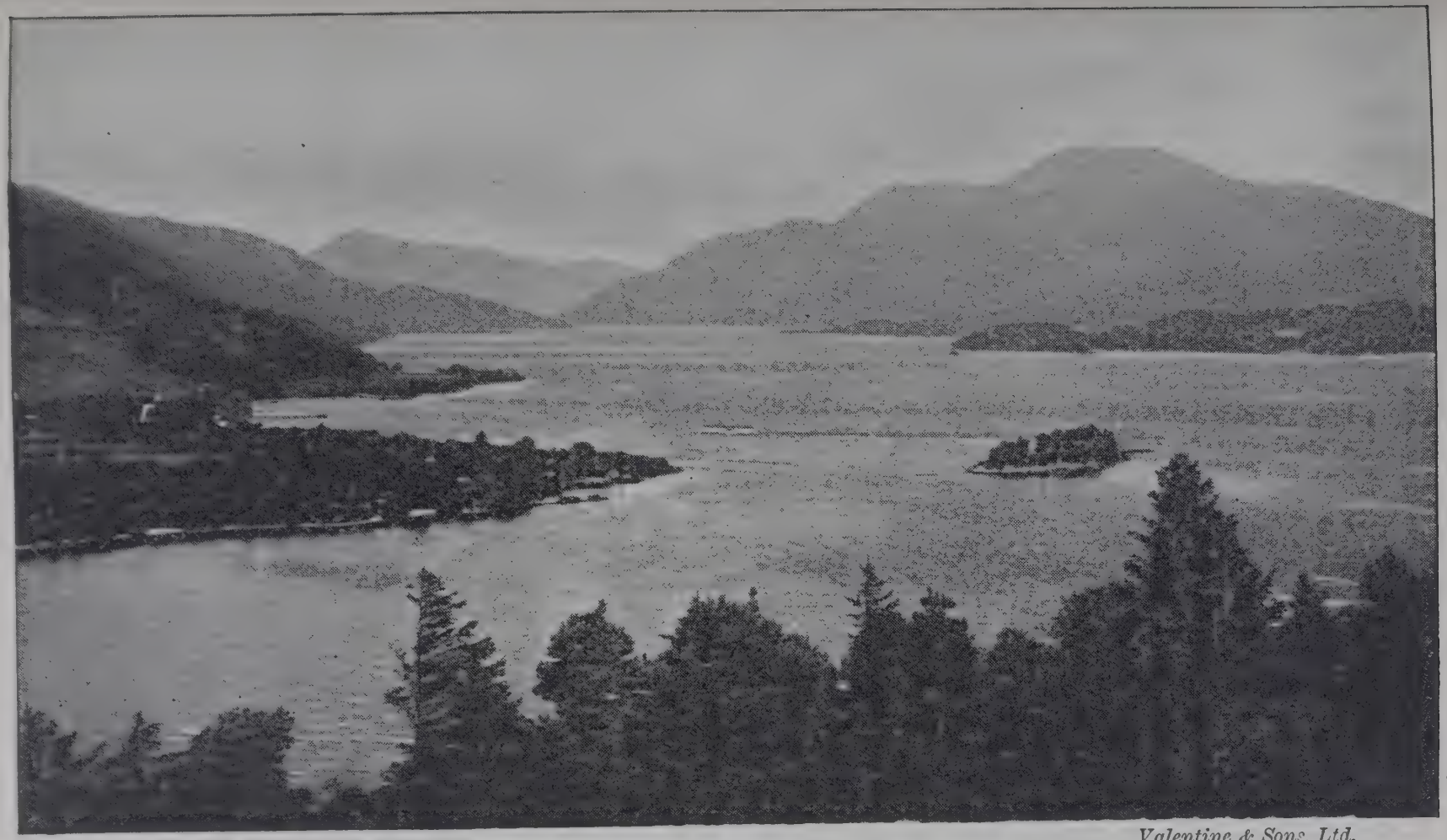

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FIG. 47. LOCH LOMOND AND BEN LOMOND

This shows the Highland or northern part of Loch Lomond with Ben Lomond to the right on the east.

Lowlands. These rivers and their tributaries flow in broad vales between the ranges of the Central Lowlands.

254. The Forth. The Forth rises in the high mountains round Loch Lomond. It soon leaves the Highlands and takes a long course eastwards. The Teith, its chief tributary, enters above Stirling. Its wild upper valley leads by the gorge of the Trossachs to Loch Katrine, through scenery made famous in Scott's *Lady of the Lake*. The contour lines in Fig. 45 show the difference between the valleys of the two rivers. The Forth crosses the 200 feet contour line a few miles below its source, and is a river of the lowlands for the greater part of its course. The Teith, which carries to it the water of many lakes, does not cross the 200 feet line till within a few miles of the confluence. Below Stirling the Forth winds across the fertile Carse of Stirling to the sea. These windings are called the 'links' of Forth. A rhyme says :—

> One crook o' the Forth
> Is worth an earldom in the North.

This is because the Carse of Stirling is covered with deep fertile soil brought down by the rivers, while many a northern earldom consists chiefly of moor and mountain. The tide runs up to Stirling.

255. Stirling. Stirling is built in the gap between the Ochils and the Campsies. It is one of the old capitals of Scotland. All possessed some advantage of situation. The coloured map shows that the route through the Stirling Gap is the easiest land route into the Eastern Highlands and the fertile vales south of them. Stirling castle rock is very like that of Edinburgh, and was formed in the same way. The view from it takes in the high peaks round Loch Lomond,

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FIG. 48. STIRLING CASTLE

Compare this view with Fig. 43 and notice the resemblance between the two castle rocks. To the north beyond the cultivated Carse of Stirling rises the high edge of the Highland plateau.

the Ochil and Campsie Hills, and the Forth winding across the Carse to the sea.

256. Fife. The Fife peninsula lies between the Firths of Forth and Tay. A Scottish king called it 'a beggar's mantle fringed with gold'. He meant that the interior is hilly and that the towns are round the coast. Coal is found along the Forth and exported by small ports. Some is used in the linen mills of Dunfermline, a few miles inland, and in the linoleum works of Kirkcaldy, on the coast. Dunfermline is another old capital. Bruce is buried in the great abbey church. St. Andrews, on the east coast, the oldest university in Scotland and the former ecclesiastical capital, has the ruins of a castle and of a magnificent cathedral.

257. The Lower Tay. The Tay leaves the Highlands at Dunkeld and flows to the sea between the Highlands and the Sidlaws to the Firth of Tay. Perth, an old capital, is built in the gap. It commands many routes into the Highlands by the valleys of the Tay and its tributaries. The Highland escarpment, rising steeply above Strathmore, is well seen from hills near the city. Below Perth the Earn flows to the Firth of Tay.

258. Dundee. Dundee stands on the northern shore of the Firth of Tay, at the base of the Sidlaws, in the Carse of Gowrie. The long Tay bridge joins it to Fife and the south. Linen was once made from Baltic flax, and carpets and coarse stuffs are now made from jute, an Indian fibre. Jam is made from fruit grown in Strathmore and the Carse of Gowrie, and marmalade from oranges grown round the Mediterranean. The advantageous position of Dundee, near the Fife coalfields and on the Tay estuary, accounts for its prosperity.

259. Occupations of the Central Lowlands. The Central Lowlands are the only thickly peopled part

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FIG. 49. THE TAY ESTUARY AND THE CARSE OF GOWRIE

This view is taken near Perth from the western end of the Sidlaws, which are seen in the foreground to the left. To the south is the Tay winding across the flat Carse to the sea. The Ochils shut in the view south of the Tay.

of Scotland. Railways, canals, and roads can be made with much less difficulty than in the Southern Uplands or the Highlands. The abundance of coal and iron has led to the rise of many manufactures round Glasgow. Manufactures are also growing on the east of the coalfield. Iron furnaces are at work in the old town of Falkirk and at other places near Grangemouth, a port on the Forth. Grangemouth is connected by canal with the Clyde, and is an eastern port for Glasgow.

260. The relation between coal, manufactures, and population is well seen in the Central Lowlands. Only 5,000,000 people live in the whole of Scotland. About 3,000,000 of these live in the Central Lowlands. More than 2,000,000 live within twenty miles of Glasgow. There are more than three-fourths of a million in Glasgow itself. Edinburgh has less than half a million.

261. Three other occupations are important. One is farming. Bad farming would not pay in Scotland, so the Scottish farmers have become the best in the world. Most farms consist of some arable land, some which can be kept in grass for cattle, and some moor or hill pasture which can only be used for sheep. Oats and barley are the chief grain crops. Oatmeal is an important food in Scotland. Much barley is made into whisky. Excellent potatoes are grown in the Lothians.[1]

262. Fishing is a very important occupation. Salmon are caught in many of the rivers, and herring, cod, and haddock round the coasts. Much fish is dried and cured. Dried fish was once the only animal food of the Scottish poor in winter. Strings of fish are still hung up to dry outside cottages near the sea.

[1] The Lothians are the counties of Linlithgow (West Lothian), Edinburgh (Midlothian), and Haddington (East Lothian).

263. The tourist industry is the third great occupation. Tourists visit Edinburgh to see the city itself and to make excursions. From Glasgow they visit many parts of the Highlands. They go to Stirling, Dunfermline, St. Andrews, and other ancient cities for their historic interest. Golfers go to Dunbar, North Berwick, or St. Andrews. Thousands of pounds are spent by tourists every year in the lowland towns.

EXERCISES

1. Colour the map in Fig. 45.
2. Draw sections of the country along the lines joining (*a*) Glasgow and Edinburgh, and (*b*) Glasgow and Stirling.
3. Why are the Scottish Lowlands the most populous part of Scotland?
4. Name the gap towns between the Campsie Fells and the Renfrew Heights.
5. Is Perth, Stirling, Dunfermline, or Edinburgh best suited to become the capital of Scotland?

CHAPTER XXVII

THE HIGHLANDS

264. Map Studies. A map showing all the contour lines of the Highlands would be difficult to read or to colour. The coloured map shows that nearly all the land is over 1,200 feet high. The edge of the Highlands looks like a mountain range from Strathmore or from the northern slopes of the Ochils and Sidlaws, but it is really the edge of a high plateau cut into separate mountain masses by the work of weather and running water.

The Forth, Teith, Earn, and Tay rise in the Highlands. Trace each to its source. Small towns have grown up where their valleys leave the Highlands.

The contour lines in Fig. 45 show how steep-sided the Highland valleys are.

265. All these rivers rise in the west and follow long courses to the eastern sea. The rivers flowing west are all short. We know from the map that they must have steep valleys and a rapid current, for they fall nearly half a mile in their short descent. Their valleys must be very picturesque. Try to use maps in such a way as to realize the kind of scenery they show.

266. Highland Scenery. The lower parts of the Highland valleys are wooded. Among the trees are the mountain ash, which is covered with red berries in autumn, the birch, and various firs. Above the woods are green or heather slopes broken by masses of dark rock. A stream runs along the valley floor, tumbling from rock to rock and forming falls where the valley is steep. In summer such streams are narrow, and there are broad belts of pebbles on each side. (See Fig. 35.) This shows that the river is sometimes much broader. A Highland stream coming down in flood after rain or snow is a grand sight. It rushes and foams along, grinding and dashing the pebbles against each other. If we pick some of these pebbles up we shall find that they are rounded, smooth, and polished. Some are red, some are white, some are grey, some are black, for the river has brought down different rocks from different parts of its course.

267. Most Highland valleys contain long narrow lakes shut in by mountains. Many are shown in the maps. The beauty of these lakes attracts many visitors in summer.

268. The higher we go the narrower the valley becomes. At last it brings us out on to the moors. Higher peaks rise above them. The moors are purple with heather in summer, and brown with ripening fern.

Blue harebells, yellow gorse, and crimson foxgloves make the colour still richer. Patches of brighter green show where the moor is boggy. Black patches show where heather has been burned to make room for grass. Boulders of rock are scattered about. At a distance it is hard to tell which are rocks and which are sheep. A sudden stir in the fern shows that we have startled

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FIG. 50. A LONELY HIGHLAND SCENE

a herd of deer. They are so nearly the colour of the fern that we could not see them till they moved. Often, too, we startle grouse from their nests in the heather.

There are few signs of men on the moors. Here and there is a lonely farm or a shooting lodge. Nearly all the country consists of sheep walks or deer forests. Deer forests are vast stretches of treeless moor.

269. The Highlands are thinly peopled. This is what we should expect in such a country. (See § 165.) It is

difficult to pass from valley to valley, for they are separated by high mountains and the passes are covered with snow in winter. In old days, when there were few roads, people seldom married or settled outside their own valleys. All were more or less related to the chief, who was a greater man than the king in his own valley. When the people of one valley went to another valley it was more often in war than in peace. Like all mountaineers the Highlanders are fierce fighters. They often made raids into the lowland vales. (Compare §§ 151, 220.) The population of the Highlands increases slowly. The young people go away because there is no work in their valleys. Many go to Glasgow, and some sail from Glasgow to Canada. All these things show how the geography of a region affects the life of a people.

The Highlanders are of the same race as the Welsh. They speak a language called Gaelic. *Aber, ben, strath, glen,* and *more* are Gaelic words. *Aber* means 'at the mouth of' (see §§ 166, 271), *Ben* means hill. We find another form of it in Pennine and Penyghent. A *strath* is a vale. *More* means great.

270. The Highland Railway to Inverness. The lines from Edinburgh and Glasgow go north by Stirling and Perth. The coloured map shows that there is no other way. The Highland railway passes Dunkeld and follows the Tay as long as its valley leads north. When it turns west the line follows first the Tummel and then the Garry valleys, both flowing to the Tay. It passes through the wooded gorge of Killiecrankie, where the Garry foams along its rocky channel between wooded hills. This gorge is sometimes called a pass, but wrongly. The scenery becomes bleaker and wilder. There are neither houses nor trees to be seen. The gradient is steep and the train climbs

slowly to Drumochter Moor, where it is about 1,500 feet above the sea. Nothing can be seen but deer forests and bare mountains. The line is fenced to prevent the snow from drifting over it in winter, but in spite of this trains are often snowed up.

Drumochter Moor is part of the divide between the Tay and the Spey. The train begins to descend to the broad strath of the Spey. In front are the Monadliath Mountains, one of the highest parts of the Highlands. The line soon leaves the Spey for a more direct route to Inverness.

271. The Coast Towns. North of Stonehaven there is a coastal plain between the sea and the edge of the Highlands. This extends to Moray Firth. Aberdeen is the most important coast town.

Aberdeen means the town 'at the mouth of the Dee'. (See § 166.) It is a university town, built of grey granite which is quarried in the mountains which shut in the Dee valley. This granite is shipped to all parts of Britain. Fishing is also very important. Aberdeen is becoming the chief port for the trawlers of the east coast of Scotland.

272. Trace the Dee and Don inland. The Dee rises in the Cairngorm Mountains, the highest part of the Eastern Highlands, near streams which flow to the Spey and Tay. The passes from the Dee to either of these rivers are long and difficult. The king has his Highland home at Balmoral.

273. Peterhead, farther north, is built of red granite. Stone is used for building all over Scotland. The houses look handsomer, feel warmer, and last longer than brick houses.

Fishing and farming are both important on the fertile northern shores of Moray Firth. The rivers are all

short except the Spey, which comes from the west. The largest towns are Elgin and Nairn.

EXERCISES

1. Write a description of Highland scenery from the maps and the pictures.
2. Why are the Highlands thinly peopled?
3. Draw a map of the route of the Highland railway from Edinburgh to Inverness.
4. What causes make Aberdeen prosperous?

CHAPTER XXVIII

THE HIGHLANDS (*continued*)

274. Map Studies. Find Glenmore, the Great Glen. It runs across Scotland from south-west to north-east (see §§ 93, 132, 252), and divides the Highlands into two parts. It is a fine natural route from sea to sea, but it crosses a part of Scotland which will always be thinly peopled. Three lakes lie on the floor of the Great Glen, which is narrow and shut in by mountains. These have been joined to form the Caledonian Canal.

275. Inverness, the northern capital of the Highlands, stands at the northern end of the Great Glen. Fort George near Inverness, Fort Augustus in the middle, and Fort William at the southern end, were built after the Highland rising in 1745. Many roads were made at the same time, and these have opened up the Highlands.

276. The Great Glen. In and near the Great Glen we see good examples of the work done by running water. Some of the finest falls in Scotland are close to the canal. Their strong current is used to make electricity, by which much machinery is now

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FIG. 51. IN THE GREAT GLEN

This is a view of one of the lakes in the Great Glen. It forms part of the Caledonian Canal. Notice how long and narrow it is. Compare its shape with that of the valley lakes in the map. The islands and shores are wooded, but in the foreground the hill slope is bare and strewn with boulders of rock. In the distance rises the high edge of the Highlands on the opposite side of the Great Glen.

turned. On the steep slopes of the mountains which fall to the Canal we see how rivers develop. The streams which flow after heavy rains have cut deep ravines in the face of the cliffs. These show how the main stream gathers up tributaries and forms a river system. Such a ravine on a much less steep hill-side is shown in Fig. 35. We can also watch the formation of deltas. These are being built up wherever streams enter lakes. Sometimes these deltas grow so large that they divide a lake into two. (See § 200.)

277. Ben Nevis. Ben Nevis, the highest mountain in Great Britain, rises nearly four-fifths of a mile above the sea behind Fort William. Snow lies in the crannies of its great north-eastern precipices all the year round. The climb to the top is long, difficult, and dangerous if the mist comes down. A high narrow rock wall runs from the summit and separates two valleys. It is something like Striding Edge on Helvellyn. The rock waste from its rotten edge constantly falls to the valleys below and builds up heaps of splintered rock at the foot of the cliffs. Such knife-edged rock walls are often found in the Highlands. They show how a mountain land is slowly weathered into shape.

278. On a clear day the country can be seen for nearly a hundred miles in all directions. The view takes in the lochs, mountains, and islands of the west coast, and extends from the jagged peaks of Skye and the Outer Hebrides to the distant hills of Ireland. East, north, and south is a sea of mountains connected by high moors and separated by deep valleys.

279. When we look over the Highlands in this way we see that it is a plateau which has been greatly weathered. The ranges are all nearly at the same level, ridge rising behind ridge. Only in the far east

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FIG. 52. BEN NEVIS AND FORT WILLIAM

This picture shows Ben Nevis, the town of Fort William, and part of Loch Linnhe. The Caledonian Canal enters to the left and is not shown. To the right Loch Linnhe opens to the south and Oban.

do the Cairngorm and Monadliath peaks rise much above the general level.

280. The Northern Highlands. The Highlands narrow north of the Great Glen. The west is still the highest part, and the longer streams run east. Some of the lakes are famed for their beauty. The towns are all fishing places on the coast. Wick is the largest. The west and north coasts are rugged and dangerous. The extreme north of Scotland forms the lowland of Caithness, which is better peopled than many parts of the Highlands.

281. The extreme north of Scotland is nearly 600 miles nearer the pole than the south of England. (See § 10.) The summer days are much longer than in Southern England. At midsummer it is never really dark. The winter days are very short. This is still more marked in the northern islands.

282. The Orkney and Shetland Islands. The Orkney Islands are separated from the mainland and from each other by stormy straits. The Shetland Islands lie farther north, in the same latitude as Christiania in Norway. They once belonged to Norway, and many Norse words are still in use.

There is some good grazing land in the Orkneys, and small shaggy ponies run wild in the Shetlands. In both groups fishing and sheep-keeping are important. Shetland wool is famous for its fine quality. Many Shetlanders go north to the Arctic whale fisheries. The knitting of Shetland shawls is a cottage industry.

283. The Sea Lochs of the West Highlands. The map shows how deeply the sea has pierced into the west coast. The land has sunk and the sea has filled the lower part of many valleys. These are called drowned valleys. The mountains form long high

peninsulas between them. Parts of the peninsulas have been cut off by the sea, and form islands which are separated from the mainland by narrow straits. Skye is the largest.

The scenery of these western firths and lochs is very grand. They are fiords, like those of Norway, but the Scottish fiords are not so long and the mountains are not so high. Firth and fiord are forms of the same word. High mountains rise steeply out of the sea and seem to shut in the loch. Then the steamer rounds a headland and another beautiful reach opens. So we may sail for miles inland till we reach the head. There the streams flowing to the loch have built up a flat delta, on which a village or small town is often built. Fish and mutton are all the place produces. Everything else comes by boat. If tourists stay there the place is prosperous in summer, but villages to which they do not go are very poor. Tobermory on Mull is a yachting centre. Oban, on Loch Linnhe, is one of the most crowded places in the Highlands in summer, but even then it has only about 5,000 people. It is the starting-point for many steamer excursions to the fine scenery of the islands and the coast. Iona with a cathedral built by Irish missionaries, and the caves of Staffa with their great rock columns, are visited from Oban.

284. The Western Isles. The Inner Isles lie near the mainland. The Outer Hebrides are separated from it by the stormy Atlantic seas. The largest is Lewis, on which is the fishing port of Stornoway. Some of the islands are large, while the smallest are uninhabited rocks. Some are mountainous, others are low. All have a wet climate, a poor soil, and much moor and bog. Those visited by tourists are the most prosperous.

The more fertile islands graze sheep and even cattle. Barley is grown and made into whisky. In the poorer islands, where there is much mountain and bog, the people live by fishing. Fish and seaweed are spread out on the land instead of manure. The houses of the peasants are poor places, built of stone and roofed with turf. Peat is the only fuel. Many cottage industries are carried on in the long winter evenings. Wool is spun and either knitted or woven. Harris tweeds are made on handlooms in the cottages of Lewis. The extreme of poverty and loneliness is found in St. Kilda, eighty miles west of Lewis. It is cut off from the world for most of the year.

EXERCISES

1. Why does snow lie on the north-eastern face of Ben Nevis all the year, though it melts on the top?
2. How far is the Great Glen useful as a natural route?
3. Describe the life of the Western Highlands. Has it any connexion with the geographical conditions?
4. Is it cheap or dear to stay at an hotel in the West Highland tourist centres? Why?

CHAPTER XXIX

THE CENTRAL PLAIN OF IRELAND

285. Map Studies. The coloured map of Ireland shows that the mountains are round the coast and that the centre is a plain. The mountains are much more broken than in Great Britain, and there are many ways between them from the Central Plain to the sea. They are most continuous round the north-west and south-west coasts. The chief rivers of the Central Plain are the Shannon in the west and the Liffey and Boyne in the

east. There is little land over 300 feet high between the Shannon and the east coast, and the river divides are not well marked. The colouring of the map shows that much of the Irish coast is bold and rugged. Many long arms of the sea called loughs[1] run into the land.

286. The Central Plain. Fig. 53 shows the most fertile part of the Central Plain. It is low and broken by few heights. Notice how little of it is above 400 or below 200 feet. The limestone surface is almost everywhere covered by clay. Limestone and clay are very differently affected by water. Limestone is porous and easily dissolved by water, but clay does not allow water to sink through it. Those parts of the plain which consist of bare limestone are very different from the part in which the limestone is covered by clay.

287. The Irish Bogs. Ireland is the first land reached by the Atlantic winds and its rainfall is heavy. Much water collects on the clayey part of the plain. The slope is so slight that the rivers do not carry it all off, but spread out into marshy lakes.

288. This condition of things reminds us of the Fen districts of England. It has led to the formation of the Irish bogs. Mosses and bog plants begin to grow in the stagnant water, and the plant growth becomes more thick and matted every year. Some bogs are so firm that men and animals can pick their way across them. Others look firm but are full of hidden pools of deep water. The largest is the Bog of Allen in the eastern part of the plain. Bogs are also formed in the mountains where the rocks are of such a kind that water cannot pass through them. These mountain bogs remind us of the mosses of Northern England and Scotland. High-lying bogs sometimes become so waterlogged and heavy that

[1] Lough is another form of loch or lake.

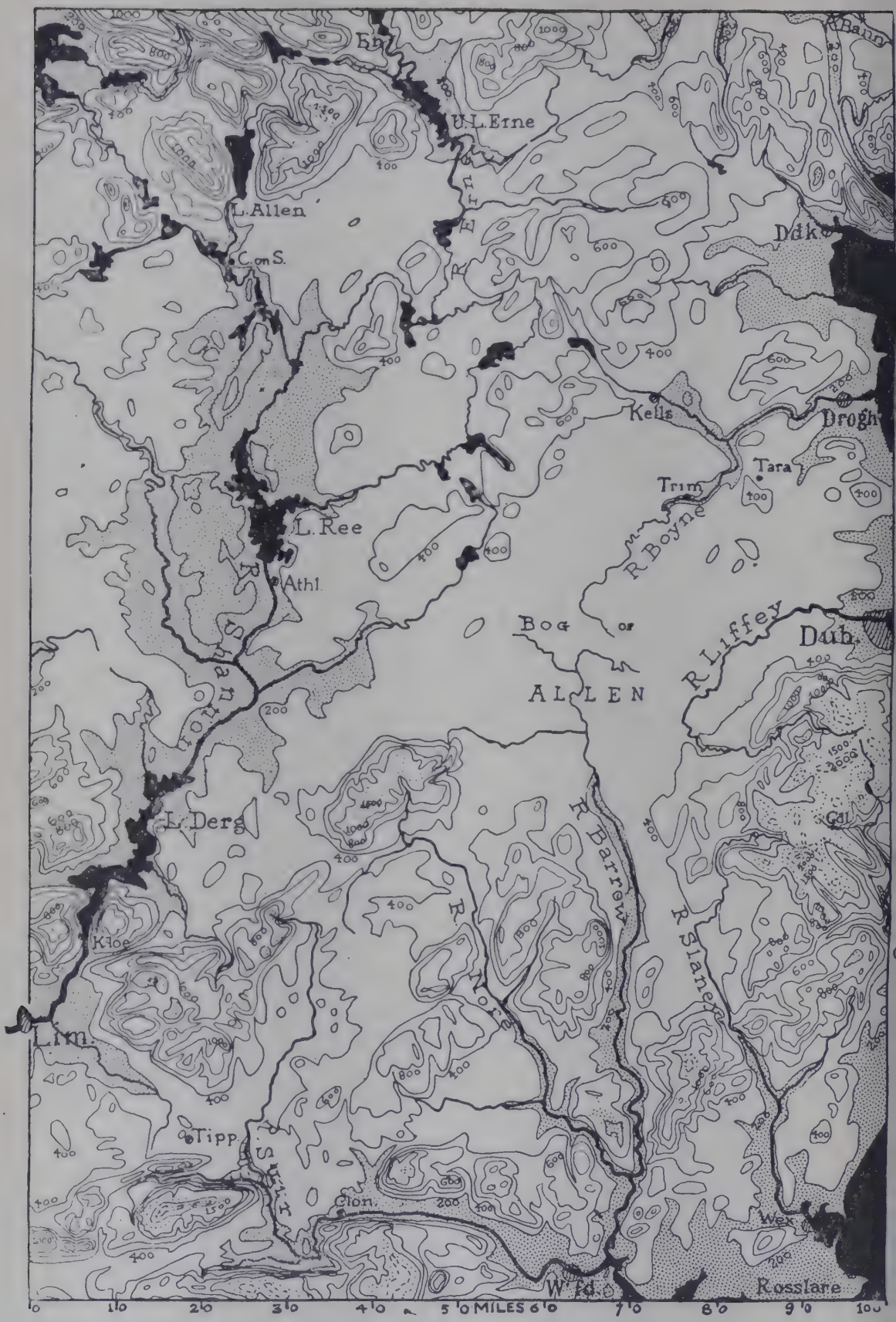

FIG. 53. MAP OF CENTRAL IRELAND

Contour lines drawn for every 200 feet up to 1,000 feet, and after that for every 500 feet. Land under 200 feet is shaded.

they slide away from their foundations. Such bog-slides often destroy houses and roads.

289. The thick plant covering is cut for burning. Turf, as it is called, is the only fuel burned by the peasants. In the limestone parts of the plain there are no bogs, but there are many lakes. These lie in basins which the water has eaten out in the limestone. Caves and underground rivers remind us of the other limestone districts of Britain. (See § 177.)

290. Economic Conditions of the Central Plain. Ireland has a heavy rainfall, and this makes its meadows green and rich. Grazing is very important. Much butter, eggs, and bacon are produced and exported. Bacon must be reckoned among dairy products, for the skim milk is largely used to fatten pigs. Oats and barley are the chief crops. Barley supplies malt for the famous Irish porter and whisky. Potatoes are very largely grown. They are a profitable crop in good years, but in bad years they become diseased. When this happens a famine follows, for potatoes are the chief food of the peasants. Most of the best food raised in Ireland is sent out of the country.

291. The greatest drawback of the Irish plain is the want of coal. This explains why there are no large manufacturing districts like those of England and Scotland. The only large towns are Dublin and Belfast. These are both on the east coast, where cheap coal can be got from the Scotch and English coalfields. The other towns of the Central Plain are markets for the grazing and horse-breeding districts around.

292. The Eastern Plain. The eastern part of the plain, between the Mourne and Wicklow Mountains, is the most fertile part of the Central Plain. It contains few lakes and the soil is fertile except in the Bog of

Allen. The largest towns are Dublin on the Liffey, the capital of Ireland, Drogheda at the mouth of the Boyne, and Dundalk on the northern edge.

293. Dublin. The map shows how well Dublin is placed. It is opposite to Holyhead and is the end of the best natural route between England and Ireland. Dublin is in the centre of the Eastern Plain, in the driest and most fertile part. It has always been the centre of the English rule in Ireland. The English administrative centre is Dublin Castle. The king is represented in Ireland by a resident Lord Lieutenant.

294. The supreme law courts, the banks and other business companies, have their head offices in Dublin. Several manufactures are carried on. Whisky is distilled from barley malt and slightly flavoured with peat. Dublin porter owes its goodness to the water brought by the Liffey from the Wicklow Mountains.

295. The Boyne Valley. The Boyne rises in hilly country near the Bog of Allen, less than 300 feet above the sea. It is a short sluggish river, flowing north-east across fertile land which once formed the kingdom of Meath. Fig. 53 shows that its lower course is through hilly country. The Boyne valley is remarkable for the number of its ancient monuments. Fine examples of its many ruined castles and abbeys are seen at the small town of Trim, once a place of great importance. Tara, on one of the low hills near the Boyne, was the old capital of Meath, but nothing remains of its splendour. Kells, on the longest tributary of the Boyne, was once a famous Irish monastery and seat of learning. It has a round tower and some Irish crosses. Similar crosses and round towers are found in other parts of the Boyne valley. The round towers were probably built as a defence against the attacks of the Danes. In

time of peace they were used as church belfries, but when danger threatened they formed a place of refuge. The door was placed high above the ground and could only be reached by long ladders. There is a picture of such a round tower in Fig. 57. The Irish crosses are of a curious shape and very finely ornamented.

296. Not many miles from Drogheda are tombs far older than any other antiquities of the Boyne. Earth has been heaped up over them till they form great artificial hills. In the side of the hill is a door, which leads by a winding passage into the heart of the hill where the real tomb is. The stones which line the passages and the inner chamber are beautifully carved. These tombs were opened and pillaged by the Danes over a thousand years ago.

297. Drogheda is the bridge-port of the Boyne, built where the river was anciently forded. It was once strongly fortified, and part of its old walls remain. Drogheda is a busy port, with flax and cotton mills, as well as breweries and tanneries. It exports provisions to Liverpool.

298. Dundalk. Dundalk is built at the southern end of a gap which leads from the Mourne Mountains into the low country round Lough Neagh. Fig. 53 shows that this gap opens an easy way between mountains over 1,000 feet high. This made Dundalk a very important bridge-port. It trades in provisions and live stock, builds ships and locomotives, and has distilleries, breweries, and flax mills.

Exercises

1. Colour any parts of Fig. 53 which refer to this chapter.
2. Describe the Central Plain of Ireland.
3. What advantages has Dublin ?
4. What do the industries of Drogheda tell us of the climate and occupations of the surrounding country ?

CHAPTER XXX

NORTHERN IRELAND

299. Map Studies. The northern part of Ireland forms the Province of Ulster. Much consists of high mountains, deeply cut by arms of the sea. The largest lowland is formed by the Bann, which rises in the

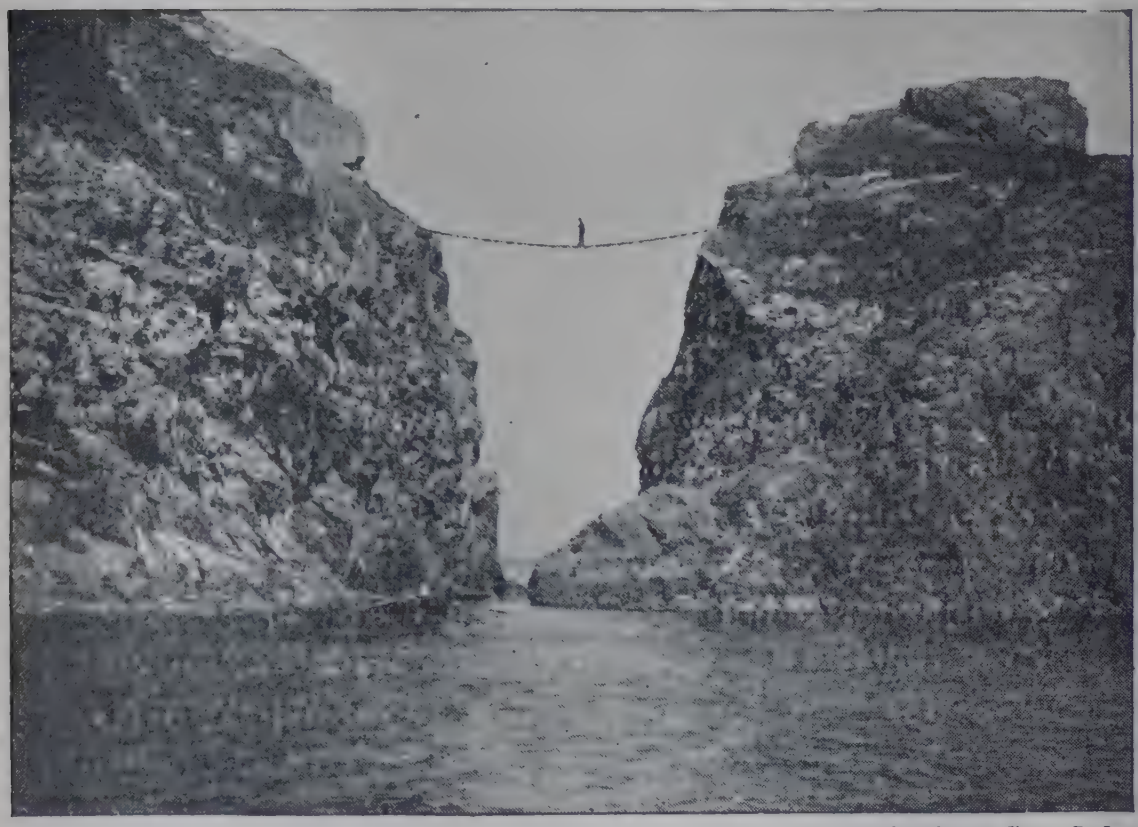

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FIG. 54. CLIFFS ON THE ANTRIM COAST

Mourne Mountains and flows through Lough Neagh, the largest lake in Britain, to the northern sea. Coleraine is a small port at its mouth. West of this lowland the country is mountainous and thinly peopled. East of the Bann are the Antrim and Mourne Mountains,

separated by the vales of the Lagan and other small rivers flowing east.

300. The Antrim Mountains. The coast between Lough Foyle on the north coast and Dundalk Bay on the east coast is bordered by magnificent cliffs. Fine cliffs are formed by the edge of the Antrim plateau, the outline of which we saw from some of the Scottish mountains. Long ago this part of Antrim was laid waste by volcanic eruptions. Great sheets of lava still cover it. The Antrim cliffs are often formed of bands of black lava lying above white chalk or limestone. In some places the molten rock has cooled into regular columns, which form the wonderful cliffs of the Giant's Causeway. The rock columns of Staffa were formed at the same time and in the same way. (See § 283.)

301. Belfast. The valley of the Lagan makes a break between the plateau of Antrim and the Mourne Mountains. The Lagan rises in the latter and flows to Belfast Lough. Belfast, the largest industrial town in Ireland, is built where it enters Belfast Lough. All the middle and lower course of the Lagan is over land less than 200 feet high, while the mountains on either side are over 1,000 feet high.

The position of Belfast has many advantages. It stands on the edge of a flax-growing district, on a good harbour which opens towards Great Britain and the North and Baltic Seas. It imports much flax from Belgium on the North Sea and from the countries round the Baltic Sea. The climate is moist and well suited for spinning and weaving flax into linen. The water, some of which is brought from the Mourne Mountains, is well suited for bleaching. The iron manufacture is important, though both coal and iron have to be imported. The position of Belfast explains

why the industry prospers. Coal can be cheaply imported from the Scottish and English coalfields on the opposite side of the Irish Sea, and iron is obtained from the Furness district. Shipbuilding has become a very important industry.

302. Linen is manufactured at many small towns near Belfast. Shirts are made at Londonderry, at the head of Lough Foyle. The country round Belfast is the most thickly peopled part of Ireland. Many of the Ulster people are descended from Scotsmen, who colonized the east of Ulster 300 years ago. This is sometimes said to be the cause of the prosperity of Belfast. We must not forget, however, that the city possesses more natural advantages than any other part of Ireland.

303. The Mourne Mountains. South of Belfast Lough are Carlingford Lough and Strangford Lough. The word lough is superfluous. Ford is the same word as the Scottish firth. The names Carlingford and Strangford were given long ago by Scandinavian pirates, who thought these arms of the sea like the fiords of their own country.

The Mourne Mountains lie east of Carlingford Lough. They are volcanic mountains with fine cliffs. Small towns are built at the mouth of lovely valleys which open to the sea. These are visited by tourists, who are bringing prosperity to many small towns.

304. The Mountains of Donegal. The Sperrin Mountains separate the Bann and the Foyle. They contain much fine scenery. The Donegal Mountains form high cliffs and headlands along the coast between Lough Swilly and Donegal Bay. Round Donegal Bay the cliffs are nearly half a mile high. The Atlantic gales beat fiercely on this wild coast. No trees can live except in the sheltered valleys which open east. The

glens, passes, long narrow valley lakes, and deep sea lochs winding inland between the mountains remind us of the Scottish Highlands.

Such a country delights tourists, who see it only in summer. They explore its glens and valleys, climb its peaks, and look out over its great cliffs to the Atlantic. It is a poor country for the peasants, who have to make a living from its scanty soil and undrained bogs. The heavy rains wash away the scanty soil from the hill slopes and make farming unprofitable. Cottage industries are as important as in the poorer parts of the Highlands. The making of Irish lace and Irish crochet are among them.

305. The Erne. The largest river flowing to Donegal Bay is the Erne. It rises in the Central Plain, and widens into many lakes, the largest of which are Upper and Lower Lough Erne. Enniskillen is beautifully placed on an island in the river between them. Fig. 53 shows that mountains rise on both sides of the latter and make the scenery very picturesque. The Erne makes an easy route from the Central Plain to the western sea.

Exercises

1. Colour any part of Fig. 53 which relates to this chapter.
2. Draw sections along the lines joining Belfast (*a*) to Fair Head, and (*b*) to Londonderry.
3. State the natural advantages of Belfast. How do they affect its industries?
4. How do you account for the fact that the linen manufacture is important on the east coast of Ireland, while the cotton is important only on the west coast of England?
5. Are cottage industries a sign of prosperity or not? Give reasons for your answer.

CHAPTER XXXI

THE SHANNON AND CONNAUGHT

306. The Shannon and Connaught. The coloured map shows that Ireland pushes far out into the Atlantic between Donegal Bay and Galway Bay. The course of the Shannon very nearly coincides with the boundary between the Provinces of Connaught and Leinster. From the colouring of the map we see that the coast is mountainous and has fine cliff scenery. The mountains have many names. Between Sligo Bay, on which is the ancient town and port of Sligo, and Killala Bay they are called the Ox Mountains. Farther west are the Mayo Mountains. Connemara Mountains lie between Clew Bay and Galway Bay. A chain of lakes separates the mountain region of Western Connaught from Eastern Connaught, which is part of the Central Plain. The largest of these are Conn, Mask, and Corrib. The two last are connected by an underground river which has sunk through the limestone.

307. Connemara. Connemara and the islands of the Connaught coast are the poorest parts of Britain. They are swept by rainy gales, and have a very heavy rainfall. The high mountains consist of hard rock, which weathers very slowly and forms little soil. Black mountain bogs cover much of Connemara. The moors are treeless and strewn with boulders. The peasants live in wretched cabins, roofed with turf. It is hard to cultivate even a small patch of hill-side. First the land has to be cleared of stones, which are built into walls. The steep slope has to be terraced to

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FIG. 55. SCENE IN CONNEMARA

Notice the high mountains, the peasant's cottage, the stony soil, the stone walls, and the patch of cultivated land.

prevent the rain from washing the soil away. After all this labour little will grow in the poor soil and wet climate. Here, as in Donegal, tourists come in summer.

308. Galway. Galway is built near the southern end of Lough Corrib, on the dividing line between the mountains and plains of Connaught. In early days it did a large trade with Spain in wine and salt. Some of the old houses, which belonged to Spanish merchants, are built in the Spanish fashion round a central court. Such traces of foreign influence are found in ports. We saw the influence of Dutch architecture in Boston. (See § 137.) The salmon fisheries of Galway are important.

309. The Shannon and its Lakes. The Shannon is the longest river in Britain. Fig. 53 shows most of its course. It rises in heights north of the Central Plain, 1,000 feet above the sea. After a few miles it widens to Lough Allen, and from this point it is navigable for 200 miles to within a few miles of the sea. It crosses the 200 feet contour line shortly after leaving the lake. Fig. 53 shows that the route from the Bann lowlands reaches and crosses the Shannon below Lough Ree at Carrick-on-Shannon. Below Lough Allen the Shannon flows across almost level land, floods the marshes and bogs along its bank, and widens into large lakes. Its tributaries flow over similar country and form lakes as they cross the plain. Below Lough Ree, a wooded lake studded with many islands, the Shannon narrows. The ford here was the easiest crossing-place for many miles up and down stream. Athlone grew up round it. The line from Dublin to Galway now crosses the Shannon there. The English built a strong castle to defend this important crossing-place. The last of the Shannon

lakes is Lough Derg, which is in the midst of fine scenery. Killaloe is at the southern end of the lake.

310. The Shannon Gorge. Fig. 53 shows that below Killaloe the Shannon flows in a gorge shut in by mountains. Killaloe is twenty miles from the sea and 100 feet above it. At Killaloe the Shannon has fallen only 100 feet since leaving Lough Allen, and it falls 100 feet in the next twenty miles. In its descent it forms the Falls of the Shannon between Killaloe and Limerick. The steepest part of a river's course is not always near its source.

311. Gorges and Gaps. Why does the Shannon valley go through these mountains instead of round them? This is the question you should ask when you see the map. We have seen such things before (see ch. x), but we have not always stopped to explain them. In nearly every case the river had taken its course before the mountains were formed. While the land was rising it was deepening its valley. If the hills had risen faster than the river did, this must have altered its course.

312. Limerick. Limerick is built at the head of the Shannon estuary. It stands in a wide plain shut in by distant mountains. The river could be bridged here at the end of the gorge and at the head of tidal water. Many roads met there. The English built a strong castle to defend this important point.

313. Limerick is the market and port of much good farming country. The fertile Golden Vale of Tipperary and Limerick opens to the Shannon from the east at the end of the Shannon gorge. Several rich valleys open from the Kerry mountains to the southern shores of the estuary. These are sheltered from the Atlantic rains by the higher mountains west of them. Cattle-

breeding and dairying are very important. The country north of the Shannon is less fertile. The largest town is Ennis on a bay opening to the estuary.

Limerick has the industries needed in the market town of such a district. It makes farming machinery and artificial manure. Much milk is condensed and much bacon is killed and cured. Bacon, butter, and eggs are exported to Great Britain.

EXERCISES

1. Colour any part of Fig. 53 which relates to this chapter.
2. Describe the course of the Shannon.
3. Explain the geographical causes which have made Athlone, Galway, and Limerick prosperous.

CHAPTER XXXII

SOUTHERN IRELAND

314. The Kerry Mountains. Western Ireland is very mountainous south of the Shannon estuary. The high Kerry mountains form parallel ranges, which run out to sea as long peninsulas. Long narrow inlets run inland between them. Some of these inlets are called bays. They are not like our English bays with their wide sweeping curves, but more like the lochs of the Western Highlands of Scotland. The highest part of the Kerry mountains is Macgillicuddy Reeks. Carrantual, the highest point, is about as high as Snowdon.

315. The Killarney Lakes. The Kerry Mountains shut in the lovely lakes of Killarney. These form three lakes dotted with wooded islands. Mountain, lake, and river scenery are seen at their finest. Above the wooded shores of the lakes rise the grey, brown, and purple

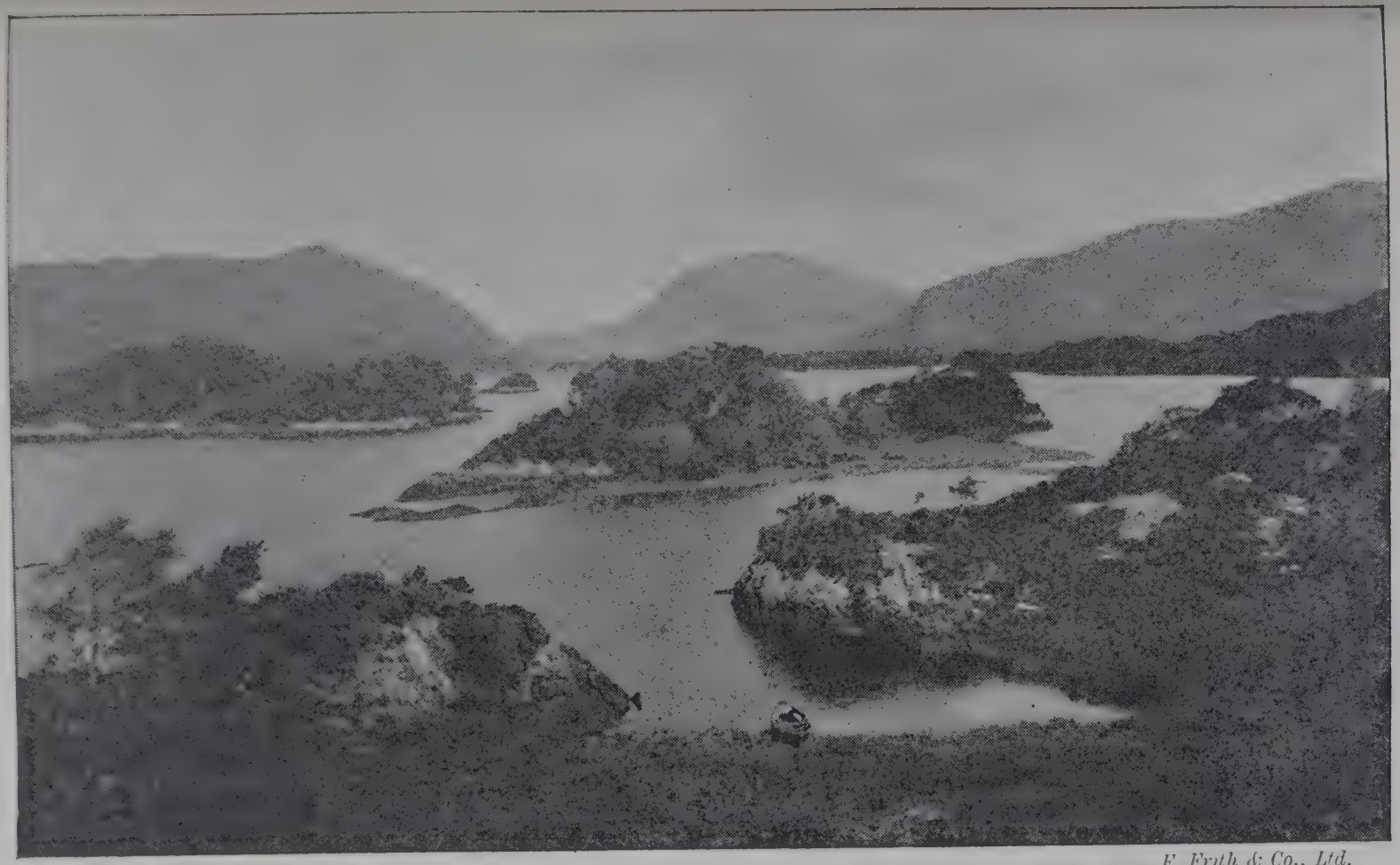

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FIG. 56. THE LAKES OF KILLARNEY

The picture shows the combination of mountain, lake, islands, and wooded shores which make Killarney famous.

rocks of the mountains. These are sometimes called the Purple Mountains from their fine colour.

316. Valentia Island. The small island of Valentia lies off the Kerry coast. It was the starting-point of the first telegraph cable laid under the waters of the Atlantic to America. The weather station at Valentia is very important.

317. Valentia is the nearest British station to America. If the daily observations made at Valentia show that strong westerly winds are coming across the Atlantic the news is telegraphed to the weather stations of Britain and the continent. The message travels over the wires faster than the winds and storms travel. We know the kind of weather we shall have several hours before we need expect it. Every day the newspapers print a forecast of the day's weather. Read it daily and compare it with the weather we actually have. These weather forecasts are made from messages about the weather received in London from all parts of Western Europe. As we get most of our weather from the Atlantic, the messages from Valentia are among the most important of these.

318. Map Studies. Look at the coloured map of Southern Ireland and see what it tells us about the lie of the land. Both mountains and river valleys run from east to west. The Lee, Blackwater, and Suir flow east in broad vales between the mountains, and then turn and flow south through gaps in the mountains to fine harbours at their mouths.

319. The Southern Vales. The Lee is a type of these southern vales. They form a very fertile part of Ireland. The mountains to the west keep off the heaviest rainfall and the fertile soil of the river vales would form good arable land. The Irish farmers find

that it pays better to keep most of the land in grass. The cattle grazed on these rich pastures give rich creamy milk. The cream is made into butter, and the skim milk fattens pigs. The dairy exports of Ireland are very important.

320. Cork. Cork, the port of the Lee, has one of the finest harbours in the world. Queenstown stands on an island in the middle of the harbour. American mails and passengers are landed here to go by the quickest possible route to London.

321. Some of the occupations of Cork are those common to all ports. Others result from its being the chief port of a rich grazing district. Cork makes machinery and manure for the farmers of the Lee Vale. Thousands of pigs are killed and cured. Milk is condensed. Butter, cheese, bacon, poultry, and eggs are shipped to the English markets.

322. Waterford[1] Harbour. Look out Waterford Harbour and the rivers which flow to it. These are the Suir from the west, and the Nore and Barrow from the north. Trace these in Fig. 53. Notice that like nearly all the Irish rivers most of their course is less than 400 feet above the sea and that much of it is below 200 feet. The Nore and Barrow rise in the mountains south of the Central Plain and unite a few miles north of Waterford, which is their market and port. The occupations and exports of Waterford are the same as those of Limerick and Cork.

323. Wexford[1] Harbour. West of the Barrow the Slaney flows from the Wicklow Mountains to Wexford Harbour. This looks a fine harbour on the map, but its mouth is blocked by a sandbar. Large steamers

[1] For the ending *ford*, see § 303.

cannot go beyond Rosslare, the Irish terminus of the South Wales and Fishguard route.

324. The Wicklow Mountains. Find the Wicklow Mountains on the map. Trace the courses of the Slaney and the Liffey, and of the tributaries of the Barrow in Fig. 53. The Wicklow Mountains rise to about 2,000 feet. Deep glens and beautifully wooded valleys are cut in them.

325. One of the most interesting Wicklow valleys is the Vale of Glendalough. We can hardly think of an Irish landscape without a lake. There are two lakes in Glendalough. The upper lake is shut in by mountains over 2,000 feet high, rising steeply from the water's edge. The valley is more open round the lower lake. Glendalough once had seven churches, and we can still trace the ruined cathedral. There is also a tall Irish cross and a round tower. In a single landscape we have all that is most typical of Ireland; mountains, lake, river, cross, round tower, and ruined cathedral.

326. Back to Dublin. From Glendalough we make our way through lovely valleys and across beautiful passes to Dublin, which looks across the Irish Sea towards Scotland, Wales, England, and the Isle of Man.

Exercises

1. Describe the industries of the vales and ports of Southern Ireland.
2. What makes Valentia Island, Cork, Waterford, and Rosslare important?
3. Why do Irish farmers find that it pays best to keep most of their land in grass?

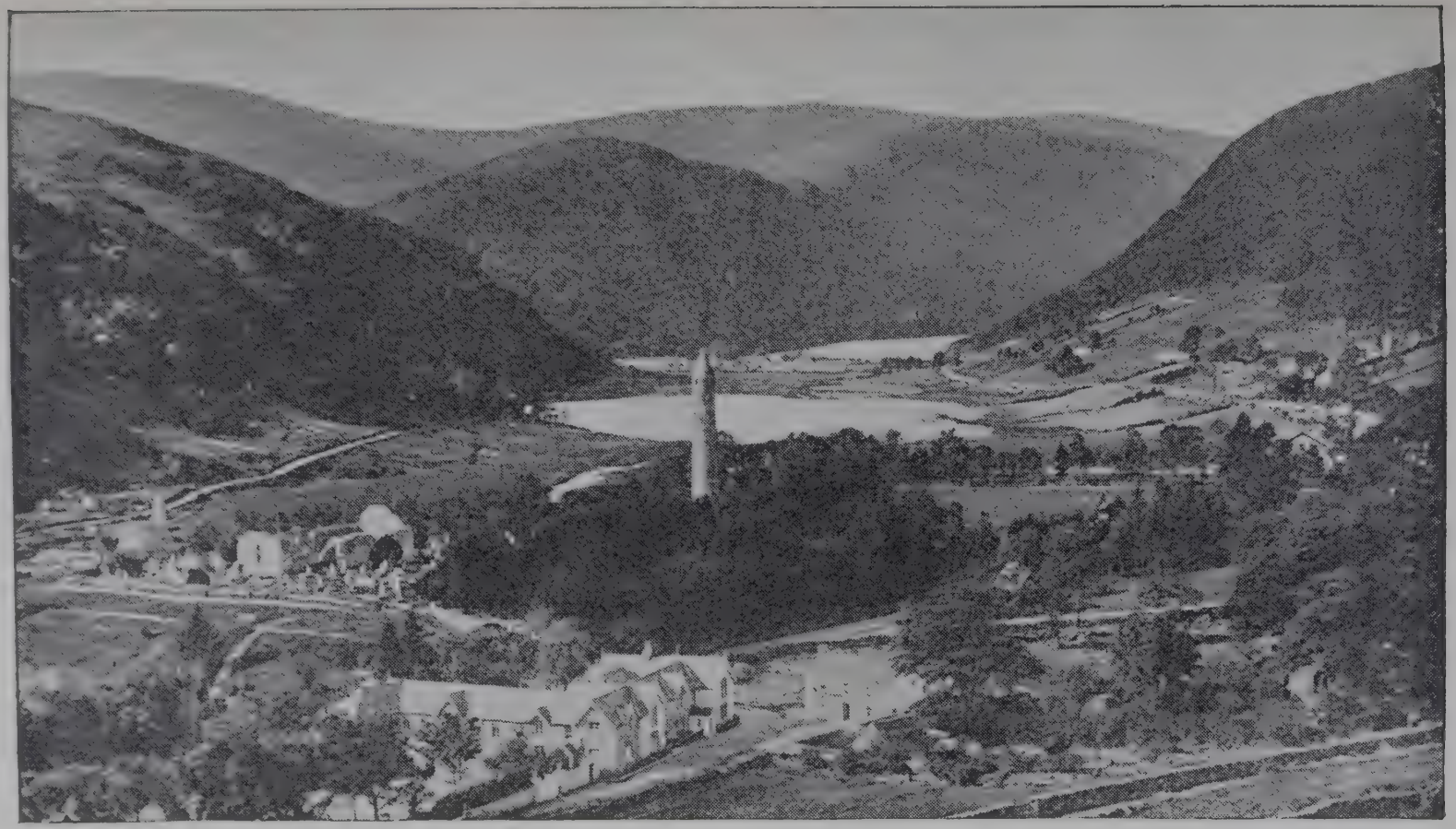

FIG. 57. THE VALE OF GLENDALOUGH

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This picture shows one of the most famous vales in Wicklow. Notice the lakes, separated by deltaic land. The round tower is very well seen. Such towers were used as refuges in time of danger. They are found in many parts of Ireland.

CHAPTER XXXIII

THE SMALLER ISLANDS OF BRITAIN

327. The Isle of Man. This mountainous island lies almost midway between the other countries of Britain. It has, what none of its larger neighbours possesses, the right to make its own laws. The highest mountain is Snaefell. On a clear day the English, Scottish, Irish, and Welsh shores can be seen from the top, which is reached by a railway. Lead and other minerals are mined in lovely glens, which open to the sea. The fisheries are very important. A very great tourist traffic is done. Douglas, the largest town, lies on the east coast opposite to the crowded towns of Lancashire, from which thousands of visitors come.

328. The Channel Islands. The Channel Islands, in the English Channel, 80 miles from England and 10 from France, are all that remain of our once great French possessions. The largest islands are Jersey (45 sq. miles), capital St. Helier; Guernsey (25 sq. miles), capital St. Peter's Port; and Alderney (4 sq. miles). They are formed of old and hard rock which weathers into steep cliffs. Owing to this and to the dangerous currents which run round them they are difficult to reach. Fishing, knitting island wool into jerseys and guernseys, and smuggling have all been important occupations, but are now replaced by the cultivation of fruit and early vegetables, with and without glass, chiefly for the English market. Cattle are bred in large numbers. The islands have self-government.

Exercises

1. Why should the Isle of Man attract tourists?
2. Account for the successive occupations of the Channel Islands.

CHAPTER XXXIV

THE CLIMATE OF BRITAIN

I. RAINFALL

329. Rainfall. So far we have spoken of heavy and small rainfalls without saying what we mean by these words. Now we must see how much rain actually falls in different parts of Britain. To do this we must know how rainfall is measured.

330. Measuring Rainfall. All over Britain there are observers who measure the rain which falls into their rain-gauges every day. A rain-gauge is a round metal jar, something like the tins in which tinned fruit are sold, fitted with a funnel of the same size. This prevents the water from evaporating. The rain-gauge is fixed in the ground. It collects the rain which falls on a piece of ground equal in size to the top of the rain-gauge. Every day, at 9 a.m., observers all over Britain go to their rain-gauges and pour the contents into a graduated glass. The relative sizes of these two must be known. Let us suppose that the rain-gauge and the measuring glass are both of the same height but that the rain-gauge holds ten times as much as the measuring glass. If the water poured out of the rain-gauge measures one inch in the measuring glass it was one-tenth of an inch deep in the rain-gauge, which holds ten times as much. The rainfall for the twenty-four hours was one-tenth of an inch, written ·1 inch. This figure is written down in the observer's diary under the proper date. Snow is melted before it is measured. A foot of snow is equal to an inch of rain. Thousands of other observations are written down all over the country at the

same time. Many schools read their own rain-gauges daily. Perhaps your school does. All these observations together give a complete record of the rainfall of Britain for that particular day. The records of all

Fig. 58. The Mean Annual Rainfall of the British Isles

observers for all days of the year form a complete record of the rainfall of Britain for that year.

All these records are sent to a head office in London, where there are large maps on which every observation station is marked. A complete map of any day's rain-

fall could be made by writing the rainfall of each station on that day beside its name on the map. Such a map would not be of much use. It is not important to know the rainfall of one particular day. What we want to know is the average rainfall.

331. Mean Rainfall. The rainfall varies greatly in different years. Some years are wet and others are dry. June is generally a dry month, but in 1903 and 1909 it was very wet. To find the average or mean rainfall of a place we must take the observations for a number of successive years, add them together, and divide the result by the number of years. The following figures were recorded in five successive years in London :—

1900	23·3 inches	
1901	22·2	,,
1902	20·8	,,
1903	38·1	,,
1904	20·7	,,
Total	125·1	,, in 5 years

If 125 inches fell in London in five successive years the average or mean rainfall was 25 inches a year. The greater the number of years the more exact is the calculation of the mean rainfall. Where only five years are taken a single wet year like 1903 affects the result considerably.

332. Similar calculations are made to find the mean annual rainfall of all other stations. These results are marked on maps. When this has been done it is found that places with a small mean annual rainfall lie in groups, while places with a heavy mean annual rainfall form other groups. Lines are drawn on the map to include all places with a given mean annual rainfall.

333. Rainfall Maps. We can draw as many of these lines as we like. Four have been made on the map in Fig. 58. The rainfall stations in the black part had a mean annual rainfall of over 60 inches. Several had much more, but we cannot tell this from the map. The places in part ruled in squares had a rainfall of between 40 and 60 inches. The places in the area ruled vertically had a mean annual rainfall of between 30 and 40 inches. The stations in the dotted part had a mean annual rainfall of under 30 inches.

334. Places with a mean annual rainfall of over 40 inches are said in this book to have a heavy rainfall. Places with a mean annual rainfall of under 30 inches are said to have a dry climate. These terms are not very exact. In 1903, when London had a rainfall of 38 inches, every one complained of the wet year. If a rainfall of 38 inches had been recorded at stations in the black part, people would have called it a dry year.

335. Rainfall of Britain. Look at the rainfall map of Britain in Fig. 58. About half of the British Isles has a mean annual rainfall of over 40 inches. The map shows that these rainy regions are all in the western parts of our islands. Nearly all the east of Ireland has a moderately heavy rainfall of between 30 and 40 inches, but a small district on the east coast is drier. In Great Britain most of the west has a rainfall of over 40 inches. The drier parts of the west are either lowlands or are protected by mountains to the west. The Cheshire Plain is an example.

336. The west is much wetter than the east. Mountains receive more rain than lowlands. The highest land in Britain is in the west. This is one reason why the west is wetter than the east. It is not the only cause, as you will see if you look at the rainfall

of the Scottish Highlands. The height of the East and West Highlands is the same, but the rainfall in the Eastern Highlands is much less heavy. The east is drier than the west even when east and west are equally high. This is one of the chief proofs that the heavy rainfall of the west is mainly due to Atlantic winds. The wettest parts of Britain are those most exposed to them. Wind observations show that these winds blow for two days out of three on an average. They pour out their rains on the highlands of the west and pass on as drier winds.

EXERCISES[1]

1. In which of the rainfall regions do you live? Which do you think are the wettest months?
2. Can you give any proofs that the rainfall of Britain depends chiefly on the Atlantic winds?

CHAPTER XXXV

THE CLIMATE OF BRITAIN

II. TEMPERATURE

337. Summer Heat and Winter Cold. The heat of the air is called its temperature. It is measured by a thermometer. All of you know what it is like, for one hangs in almost every school. There are several kinds of thermometers, but a Fahrenheit thermometer is generally used in this country. It is graduated from 212° F., the heat at which water boils, to 32° F., the heat at which water freezes. When a thermometer sheltered from the direct heat of the sun registers over 70° F. every one in this country feels it very hot.

[1] Many exercises will be found in Unstead's *Practical Geography*, Part I (Clarendon Press).

338. Temperature observations are made all over Britain at fixed hours every day, twice or oftener. The thermometers are sheltered from the direct rays of the Sun. The readings of the shaded thermometers are used to find the mean temperature of each day. The readings are sent periodically in the same way as rainfall observations to the London head office. From all the observations received the mean temperature of each month and of each year is calculated for each place. These results are entered on maps, and lines are drawn through all places having the same mean temperature in any given month or in any given set of months. These lines are called isotherms or lines of equal heat.

339. Temperature Maps. The maps in Fig. 59 and Fig. 60 show the mean annual temperature of the British Isles in midwinter (January) and midsummer (July). In summer the hottest part of England is round London, where the temperature is over 64° F. on an ordinary July day. The isotherm marked 62° F. passes through all the places which have an average July temperature of 62° F. Most of Southern England has a mean temperature of between 62° F. and 64° F. in July. No part of Wales, Scotland, or Ireland has so hot a summer as this. The warmest part of Ireland in summer is the south-east, where the mean July temperature is over 60° F. No part of Scotland is so warm as this in July, but Wales, Cornwall, and most of Central England have a July temperature of over 60° F. The rest of Ireland has a mean July temperature of between 58° F. and 60° F. This is the summer temperature of Northern England and of Scotland south of the Highlands. The July temperature of most of the Highlands is between 56° F. and 58° F., except in the extreme

north, which is cooler. Some of the figures used in making these calculations were taken at hill stations. Allowance has been made for this. Observations show that the temperature falls about 1° F. in the British Isles for every 300 feet of height. The maps show what the

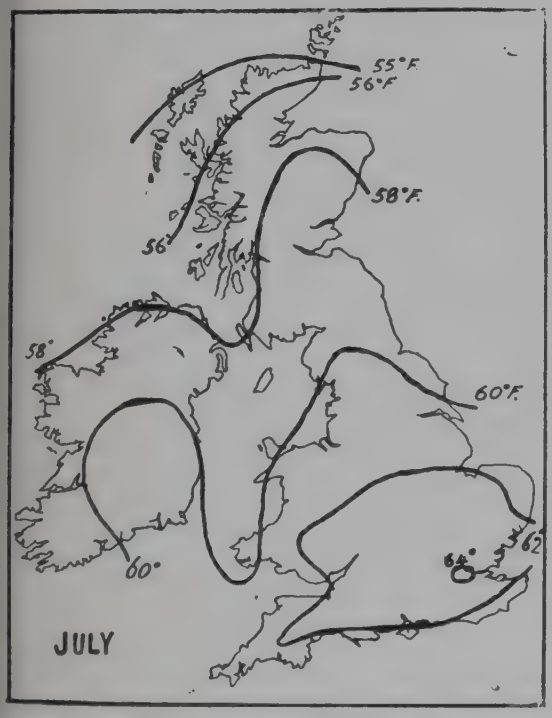

FIG. 59. Mean Temperature of the British Isles in July, reduced to sea-level.

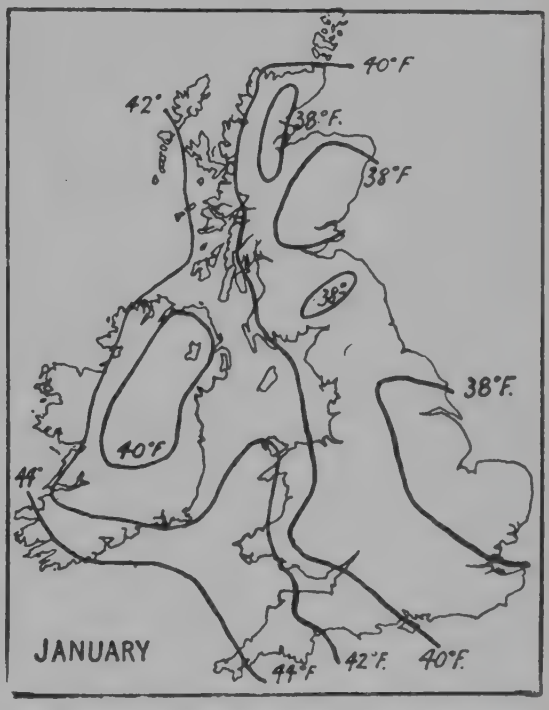

FIG. 60. Mean Temperature of the British Isles in January, reduced to sea-level.

July temperature would be if the whole of our islands were at sea level.

340. Now let us look at the map which shows the mean January temperature in the British Isles. Here again allowance has been made for difference of height in mapping the observations. Water freezes at 32° F., but no place at sea level in the British Isles has so low a mean monthly temperature. Long frosts are very uncommon. The lowest mean January temperature is

38° F., which is well above freezing point. This is found in the east of England and Scotland, on the side farthest from the Atlantic. The coldest part of Ireland has a temperature of under 40° F., which is the winter temperature of most of Great Britain. The extreme west of Scotland, Wales, most of Ireland, Cornwall, and part of South-west England have a January temperature of between 40° F. and 42° F.; and the extreme west of Ireland and Cornwall have a January temperature of between 42° F. and 44° F. In the extreme south-west of both it is over 44° F.

341. The Influence of the Atlantic. The mid-winter map shows that latitude has little to do with our winter climate. If it had, London would not be colder than Lewis, which is 500 miles farther north. The winter temperature of the different parts of Britain depends much more on their position east or west than on their position north or south. All the west of Britain is warmer than any part of the east in winter. This again is due to the Atlantic winds. Their influence is well seen in Ireland. The coldest part is the centre, where the Atlantic breezes are least felt. The influence of the Atlantic winds is not so marked in the summer isotherms as in the winter ones. Latitude has more influence on the heat of summer than on the cold of winter.

342. We owe much to our mild Atlantic winters. Our seas are never frozen and trade goes on all the year round. Our rivers seldom freeze, and except in the north deep snow never lies for more than a few days. Sea and land are frozen in winter in some countries of Europe in the same latitude. The farther a country is from the sea the more extreme its climate becomes. It has what is sometimes called a continental climate,

with very hot summers and cold winters for its latitude. An equable climate like our own, where the sea breezes make the winters mild and the summers cool for the latitude, is sometimes called an oceanic or insular climate.

Exercises

1. What is an isotherm? Why do the January isotherms run north and south?

MEAN MONTHLY TEMPERATURES AT KEW

(*Degrees Fahrenheit*)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
38·8	40·6	42·2	47·7	52·6	59·0	62·9	61·8	57·2	50·2	42·5	40·0

2. Which are the hottest and coldest months at Kew? What is the mean annual temperature?

3. The difference between the means of the hottest and coldest months is called the mean annual range of temperature. What is the mean annual range at Kew?

Note.—The last two exercises are taken by permission from Unstead's *Practical Geography*, Vol. I (Clarendon Press), where many other useful exercises will be found.

CHAPTER XXXVI

MAPS OF THE BRITISH ISLES

343. Different Kinds of Maps. In describing the British Isles we have used the coloured map, which shows the height of the land, and maps which show temperature and rainfall. We might have used many others. We have seen that there are great differences between clay, chalk, limestone, and other regions. If

we had a map of the surface rocks as well as of the heights of the British Isles we should know better what each region was like. Such maps are difficult to make on a small scale, because many different kinds of rock

Fig. 61. The Coal Bearing Areas of the British Isles

are found at the surface in Britain. The map in Fig. 61 shows the chief coal- and ironfields.

344. Vegetation Maps. All kinds of geographical facts can be shown by maps. The map in Fig. 62 shows the kind of vegetation which covers the surface of

Britain. Where the map is black the surface consists of moors, hill pasture, and waste land. The white part is farming land, which is partly ploughed and partly in

Fig. 62. The Vegetation of the British Isles

grass. The dots show where the country is wooded. If you compare this map with the coloured map you will find that the moors, hill pasture, and waste land are found in the high parts of Britain and that the farming land is in the lowlands.

FIG. 63. DISTRIBUTION OF PERMANENT PASTURE

FIG. 64. DISTRIBUTION OF CULTIVATED LAND

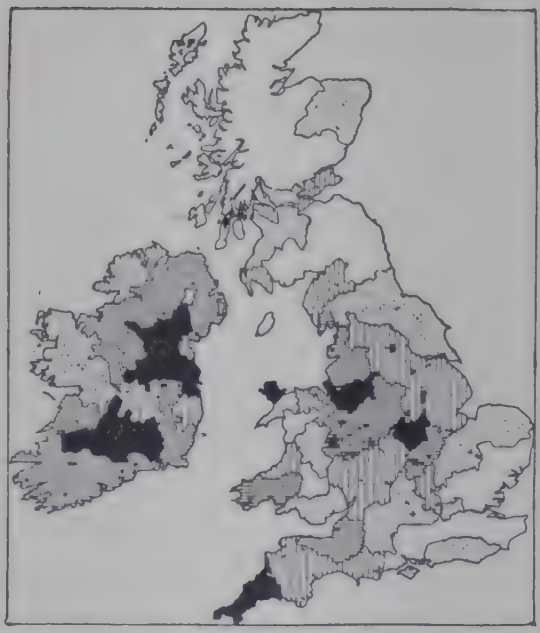

FIG. 65. DISTRIBUTION OF CATTLE

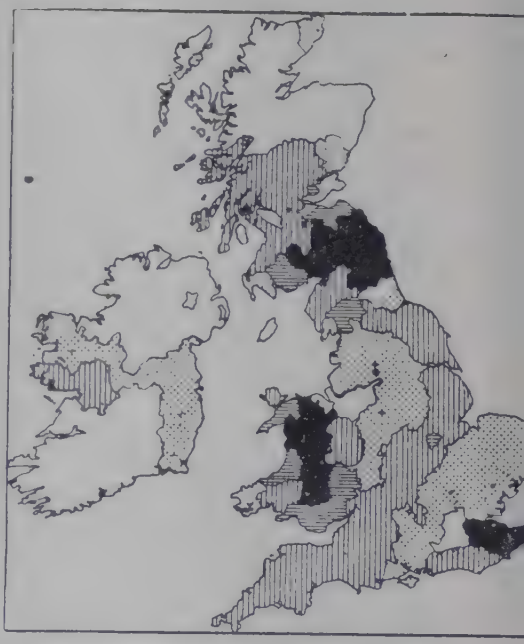

FIG. 66. DISTRIBUTION OF SHEEP

345. The map in Fig. 63 shows what parts of Britain are kept in rich grass as permanent pasture. This does not include the poor hill pastures. In the parts coloured black, over 500 acres out of every 1,000 acres are permanent pasture. This is more than half of the whole area. These black patches show that the chief grazing areas are in the western plains and vales of England, several counties of Wales, and in Ireland. Nearly all Ireland is black. Grazing is also important in the land which is ruled horizontally. This includes the Midlands and part of Wales. In the regions ruled vertically, more than a quarter of the land is in permanent pasture. In the dotted areas less than a quarter is pasture. In the white parts there is hardly any permanent pasture. The map shows that there is very little permanent pasture in Scotland and other high parts of Britain. If you compare the map with the rainfall map (Fig. 58), you will also see that there is not much permanent pasture in the dry parts. Permanent pasture is found in the wetter parts of Britain in the plains and vales.

346. The map in Fig. 64 shows the distribution of cultivated land. In the parts coloured black more than half the land is ploughed. These well-farmed districts lie round the Firth of Forth in Scotland and in Eastern England. The horizontal lines show where about three-eighths of the land is farmed. Cornwall is cultivated to this extent, for the fine climate makes farming important in the plains and vales. In Ireland the only well-cropped districts are round Belfast Lough and Dundalk Bay. Crops are less important than pasture in the other parts of Britain. You can see this by comparing the two maps. A great part of the Scottish Highlands is dotted or white in both maps, showing that

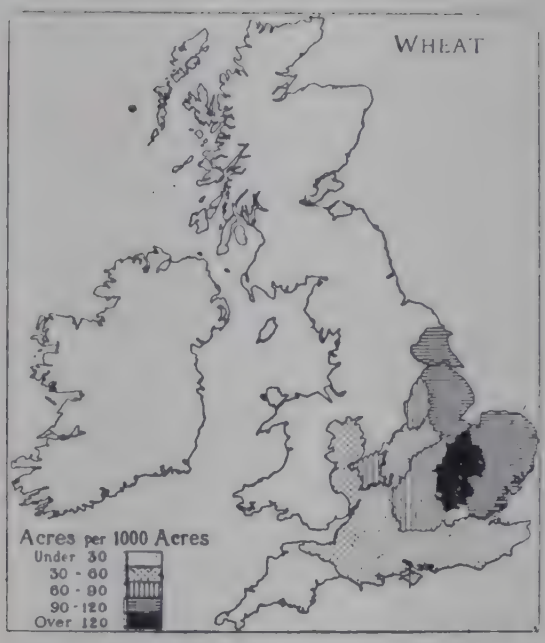

FIG. 67. DISTRIBUTION OF WHEAT

FIG. 68. DISTRIBUTION OF AGRICULTURAL POPULATION

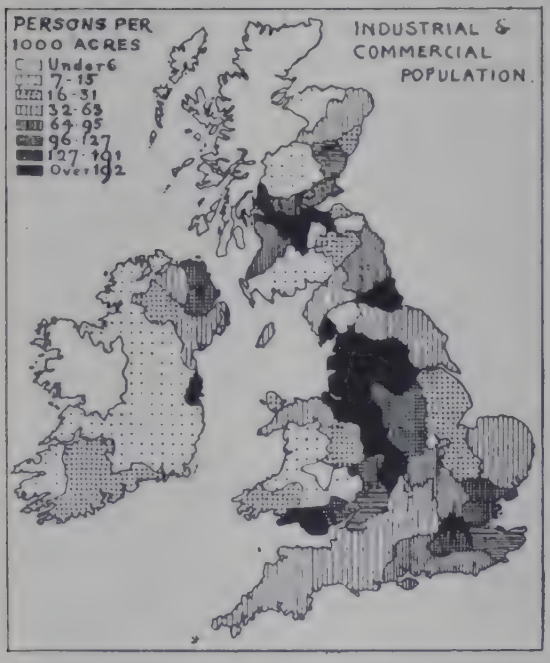

FIG. 69. DISTRIBUTION OF INDUSTRIAL AND COMMERCIAL POPULATION

FIG. 70. DISTRIBUTION OF POPULATION

little pasture land or farming land is found. This is explained by the coloured elevation map.

347. The distribution of wheat is shown in the map in Fig. 67. Wheat is hardly grown outside Eastern England. In the same way we might make maps showing the distribution of such crops as barley, potatoes, hops, and flax. We should discover many interesting things by comparing such maps with the elevation and rainfall maps. A comparison of these shows at once why wheat is grown only in one part of Britain.

348. The Distribution of Animals. The map in Fig. 65 shows how cattle are distributed. Compare this map with the elevation map, the rainfall map, and the pasture map. In Anglesea and some parts of Ireland, more than 300 cattle are kept on an average on every 1,000 acres. In all the black parts there are on an average over 250 cattle to every 1,000 acres. Nearly all Ireland is black, but in England cattle are not found in such numbers except in the western plains. In Scotland most cattle are kept in Fife and Galloway. In the horizontally shaded parts over 200 cattle are found on an average for every 1,000 acres. In the other regions cattle are fewer.

349. The map in Fig. 66 shows where sheep are most numerous. In the Southern Uplands, the Welsh Mountains, and the North Downs there are more than 800 sheep to 1,000 acres. These parts are coloured black. In the dry eastern parts of the Southern Uplands and the Welsh Mountains over 1,000 sheep are kept to 1,000 acres, but this the map does not show. Sheep are almost as important in the parts which have cross shading. These include parts of the Southern Uplands, the Welsh Mountains, and the dry chalk heights round the Wash. There are not many sheep in the Scottish Highlands, and the elevation map

explains why. There are not many sheep in Cheshire either, and the maps showing the distribution of rainfall and cattle explain why.

350. Population Maps. The last set of maps shows how population is distributed in Britain. Fig. 68 shows the number of people who live by agriculture in different parts. From sixteen to thirty-one people live by agriculture per 1,000 acres in most parts of England and Ireland. The number is less in Scotland and Wales. In the Highlands and some parts of the Southern Uplands less than six persons make a living in this way per 1,000 acres. More than thirty-one persons can live per 1,000 acres in the lowlands of Ulster and Meath. The largest agricultural population is found in the lower Thames Valley. This is due to the importance of market gardening round London.

351. The map in Fig. 69 shows the distribution of the industrial and commercial population. Over 200 people live in this way for every 1,000 acres in the chief coalfields of England, Scotland, and Wales, and in the capitals of London, Edinburgh, and Dublin. The population of the towns is very large. Notice that the industrial population is not so large immediately north of Glasgow as in the lowlands south of Glasgow. The only parts of Ireland with a considerable industrial population are Dublin and north-east Ulster. There is no industrial population in Connaught, in most of the Scottish Highlands, and in much of Wales.

352. The map in Fig. 70 shows the distribution of the population of Britain, counting every man, woman, and child. Compare it with the maps showing the distribution of elevation, of coal, pasture, agricultural land, sheep and cattle, and you will understand it better. The black parts, with over 900 people to the square mile, are either round the coalfields or round the

capital. The population of London is nearly 40,000 to the square mile. Population from 600 to 900 per square mile is cross ruled, from 400 to 600 it has a horizontal ruling, from 200 to 400 a vertical ruling, from 100 to 200 is dotted, and under 100 is white. Surrey is thickly peopled, because many well-to-do Londoners live among its pine woods and heather. The population of Essex and Kent is made larger by their nearness to London. Notice too that outside the coalfields, but at no great distance from them, there are well-peopled districts which use cheap coal for their manufactures.

353. The difference between the population of Northumberland and Durham seems strange. Durham is a small county and its moors and mountains are not very large in proportion to its industrial importance. Northumberland is a large county with a very large proportion of moor and mountain. Naturally it would have had the same population as Cumberland (176), but its busy manufacturing towns raise the average to nearly 300.

354. The only thickly peopled part of Ireland is round Dublin. The country round Belfast comes next. In Scotland the Central Lowlands are the only thickly peopled part.

Exercises

1. What do you notice when you compare the coal and elevation maps?
2. By comparing the sheep and elevation maps?
3. By comparing the wheat map with the rainfall map?
4. By comparing the cattle with the elevation map?
5. By comparing the map showing density of population with the elevation map?
6. By comparing the elevation map with the map showing the distribution of agriculture?
7. By comparing the coal map with the density of population map?

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Stonehaven
Montrose
STRATHMORE
Sidlaw Hills
Dundee
Firth of Tay
Perth
St. Andrews
Fife Hills
Firth of Forth
Bass Rock
North Berwick Law
St. Abbs Head
EDINBURGH
Berwick
R. Tweed
Abbey
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